M00146.AR.005839
MCAS CHERRY POINT
5090.3a

WORK PLAN FOR REMEDIATION OF SUBSURFACE PETROLEUM CONTAMINATION AT TANK FARM B MCAS CHERRY POINT NC

6/20/1997

J.A. JONES ENVIRONMENTAL SERVICES

WORK PLAN
D.O. # 0017

Remediation of Subsurface Petroleum Contamination at Tank Farm B

Department of the Navy, Atlantic Division
Contract No. N62470-93-D-3033
POLRAC
MCAS, Cherry Point
North Carolina

June 20, 1997

Project No. 945817

Prepared for:

J. A. Jones Environmental Services
Park South Drive, Suite 104
Charlotte, North Carolina 28210

Prepared by:

ICHOR Services, Inc.
300 Oxford Drive
Monroeville, Pennsylvania 15146

William A. Buccille, P.E.
Senior Project Engineer

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

1.1 Basis of Design 1-1
1.1.2 Site Environmental Conditions 1-2
1.1.3 Project Objectives 1-3
1.1.4 Remedial Action Plan 1-3
1.1.4.1 Phase I Remediation 1-3
1.1.4.2 Phase II Remediation 1-4
1.1.5 Phase I Components 1-4
1.1.5.1 Free Product Recovery 1-4
1.1.5.2 Soil Vapor Extraction System 1-5
1.1.5.3 Electrical Systems 1-6
1.1.5.3 Sequence of Operation 1-6
1.2 SCOPE OF WORK 1-7
1.2.1 Preliminary Site Activities 1-7
1.2.1.1 Preconstruction Plans 1-7
1.2 Utility Reconnaissance 1-7
1.2.2 Mobilization 1-7
1.2.3 Site Preparation 1-8
1.3.4 Product Recovery and SVE Well Installation 1-9
1.3.5 Piping System Installation 1-10
1.3.6 Installation of Well Oil Skimmers 1-12
1.3.7 Equipment Building Construction 1-12
1.3.8 Oil Transport Truck Loading Basin Construction 1-14
1.3.9 Recovery and SVE Equipment Installation 1-14
1.3.10 Electrical System Installation 1-15
1.3.11 Systems Testing 1-15
1.3.12 Site Restoration 1-16
1.3.13 Systems Start-Up 1-16
1.3.14 Demobilization 1-16
1.3.15 Operation and Maintenance 1-17
1.4 CONSTRUCTION SCHEDULE 1-17

2.0 SAMPLING, ANALYSIS AND TESTING PLAN 2-1

2.1 CHEMICAL SAMPLING AND ANALYSIS 2-1
2.1.1 Sampling Strategy 2-1
2.1.2 Sampling Methodologies 2-3
2.1.2.1 Samples for Waste Characterization 2-3
2.1.2.2 Effluent Water 2-5
2.1.2.3 SVE System Air Quality Sampling 2-6
2.1.3 Sample Handling 2-6
2.1.4 Analytical Methods 2-7
2.1.5 Field Sampling Quality Control 2-8
2.1.5.1 Sample Labels 2-8
2.1.5.2 Sample Custody and Handling 2-8
2.1.5.3 Field Documentation 2-9
2.1.6 Laboratory QA/QC 2-10
2.1.6.1 Laboratory Management of Samples 2-10
2.1.6.2 Sample Disposal 2-11
2.1.6.3 Equipment Decontamination 2-11
2.2 CONSTRUCTION MATERIALS SAMPLING AND TESTING 2-11
2.2.1 Concrete 2-11
2.2.2 Backfill and Fill Material Testing 2-12

3.0 WASTE STREAM MANAGEMENT PLAN 3-1

3.1 SUMMARY OF WASTE STREAMS 3-1
3.2 WASTE CHARACTERIZATION 3-1
3.3 DISPOSAL OF WASTE STREAMS 3-1
3.3.1 Determination of Required Treatment Technology 3-1
3.3.2 Disposal Facility Selection 3-1
3.3.3 Disposal Arrangements 3-2
3.4 TRANSPORTATION OF WASTESTREAMS 3-2
3.4.1 Containerization Requirements 3-2
3.4.2 Transportation Procurement 3-2
3.4.3 Required Shipping Papers 3-2
3.5 WASTE STREAM DOCUMENTATION AND SUBMITTALS 3-2
3.5.1 Submittals 3-2
3.5.2 Determination of Required Documentation 3-2

4.0 ENVIRONMENTAL PROTECTION PLAN 4-1

4.1 PURPOSE 4-1
4.1.1 Work Description 4-1
4.1.2 Permits 4-1
4.1.3 Environmental Conditions Report 4-1
4.2 EMERGENCY AND DECONTAMINATION EQUIPMENT 4-2
4.2.1 Small Scale Emergency Equipment 4-2
4.2.2 Large Scale Emergency Equipment 4-2
4.2.3 Decontamination Equipment 4-2
4.3 PREVENTIVE ACTIONS 4-2
4.3.1 Equipment Maintenance 4-3
4.3.2 Housekeeping Program 4-3
4.4 PROTECTION OF NATURAL RESOURCES 4-3
4.4.1 Wetland Areas 4-3
4.4.2 Oily Waste 4-3
4.4.3 Historical and Archeological Resources 4-4
4.4.4 Erosion and Sediment Control 4-4
4.4.5 Excess Soil Treatment and Disposal 4-4
4.4.6 Construction Debris 4-5
4.4.7 Air Pollution Control 4-5
4.4.8 Water Pollution Control 4-5
4.4.9 Dust Control 4-5
4.4.10 Spill Containment 4-5
4.4.11 Hazardous Materials 4-6
4.4.12 Foreign Object Damage 4-6

5.0 SITE HEALTH AND SAFETY PLAN 5-1

5.1 INTRODUCTION 5-1
5.1.1 Health and Safety Program Maintenance 5-1
5.1.2 Plan Acceptance 5-1
5.1.3 Terminology 5-2
5.1.4 References 5-3
5.1.5 Site History and Description 5-3
5.2 SITE HEALTH AND SAFETY PERSONNEL 5-3
5.2.1 Certified Industrial Hygienist 5-4
5.2.2 Site Health and Safety Officer 5-4
5.2.3 Site Labor Forces 5-4
5.3 TRAINING REQUIREMENTS 5-5

5.3.1 OSHA 1910.120 Training 5-5
5.3.2 Site-Specific Training 5-5
5.3.3 Daily Safety Meeting 5-5
5.3.4 Emergency First Aid Training 5-6
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 5-8
5.5 WORK ACTIVITIES 5-8
5.6 POTENTIAL HEALTH HAZARDS 5-8
5.6.1 Setup/Construct Temporary Facilities 5-9
5.6.2 Recovery and SVE Well Installation 5-10
5.6.3 Piping System Installation 5-10
5.6.4 Installation of Well Oil Skimmers 5-10
5.6.5 Equipment Building Construction 5-10
5.6.6 Treatment System Installation 5-11
5.6.7 Oil Transport Truck Loading Basin Construction 5-11
5.6.8 Systems Testing 5-11
5.6.9 Site Restoration 5-11
5.6.10 System Start-Up, Operation & Maintenance 5-12
5.6.11 Demobilization 5-12
5.7 POTENTIAL SAFETY HAZARDS 5-12
5.7.1 Setup/Construct Temporary Facilities and Site Controls 5-14
5.7.2 Recovery and SVE Well Installation 5-14
5.7.3 Piping System Installation 5-14
5.7.4 Installation of Well Oil Skimmers 5-14
5.7.5 Equipment Building Construction 5-14
5.7.6 Recovery and SVE Installation 5-15
5.7.7 Oil Transport Truck Loading Basin Construction 5-15
5.7.8 Treatment System Testing 5-15
5.7.9 Site Restoration 5-15
5.7.10 System Start-Up, Operation & Maintenance 5-15
5.7.11 Demobilization 5-16
5.8 PERSONNEL PROTECTION 5-16
5.8.1 Potential Health Hazard Protection 5-16
5.8.1.1 Personal Protection Equipment 5-17
5.8.1.2 Frequency and Types of Air Monitoring 5-18
5.8.2 Potential Safety Hazard Protection 5-19
5.8.3 Hearing Conservation Plan 5-20
5.9 WORK ZONES AND SITE CONTROL 5-21
5.10 DECONTAMINATION 5-21
5.10.1 Personnel Decontamination 5-22
5.10.2 Equipment Decontamination 5-23
5.10.3 Wastewater Disposal 5-23
5.11 CONTINGENCY PLAN 5-24
5.11.1 General Response Conditions 5-24
5.11.1.1 First Aid 5-24
5.11.1.2 Accident Report and Response Procedure 5-24
5.11.1.3 Response Requirements 5-25
5.11.2 Responsibilities 5-25
5.11.3 Public Response Agencies 5-25
5.11.4 Emergency Response Equipment 5-25
5.11.5 Accidents and Non-Routine Events 5-26
5.11.5.1 Workers Injury 5-26

5.11.5.2 Heat/Cold Stress 5-27
5.11.5.3 Fires 5-29
5.11.5.4 Inclement Weather Conditions 5-30

6.0 QUALITY CONTROL PLAN 6-1

6.1 INSPECTIONS AND VERIFICATIONS 6-1
6.1.1 Recovery and SVE Well Installation 6-2
6.1.2 Piping System Installation 6-3
6.1.3 Installation Of Well Oil Skimmers 6-4
6.1.4 Treatment Building Construction 6-5
6.1.5 Recovery and SVE Equipment Installation 6-7
6.1.6 Oil Transport Truck Loading Basin Construction 6-8
6.1.7 System Testing 6-10
6.1.8 Site Restoration 6-10
6.1.9 Laboratory Analysis 6-11
6.1.10 Backfill and Fill Material Testing 6-11
6.1.11 Select Material Testing 6-11
6.1.12 Density Tests 6-12
6.1.13 Concrete 6-12
6.2 DOCUMENTATION 6-12
6.2.1 SQA Responsibilities 6-12
6.2.2 Notices To NTR 6-14
6.2.3 Station Permits 6-14
6.2.4 Daily Reports, Production 6-14
6.2.5 Daily Reports, QC 6-14
6.2.6 QC Meeting Minutes 6-14
6.2.7 As-Builts 6-14
6.2.8 Test Plan And Log 6-15
6.2.9 Monthly Status Reports 6-15
6.2.10 Monthly Rework Item List 6-15
6.2.11 Contractor Close-out Report 6-15
6.3 SUBMITTAL REGISTER 66-15
6.4 TESTING LABORATORY QUALIFICATION 6-15

7.0 TECHNICAL SPECIFICATIONS ERRATA 7-1

8.0 CONTRACTOR - GENERATED CONSTRUCTION DRAWINGS 8-1

9.0 REFERENCES 9-3

TABLES

2.1 Sampling and Analysis Summary

FIGURES

2-1 Equipment Decontamination Procedure
2-2 Pre-Sampling Activities Data Log
2-3 Field Activity Daily Log
5-1 Site Health and Safety Plan Acceptance Form
5-2 Sign-In Log
5-3 Daily Safety Meeting Log
5-4 Air Monitoring Log

5-5 Emergency Telephone Numbers
5-6 Route to Hospital Map
5-7 Employee Injury Report
6-1 Contractor Quality Control Report
6-2 Deficiency Report
6-3 Rework Item List
6-4 Submittal Report
6-5 Project Organization Report
6-6 Contractor Production Report
6-7 Testing Plan and Log
6-8 Change Log

Appendices
Appendix A Construction Schedule
Appendix B Erosion and Sediment Control Plan
Appendix C Technical Specifications
Appendix D Calculations

WORK PLAN

Remediation of Subsurface Petroleum Contamination at Tank Farm B MCAS, Cherry Point North Carolina Contract No. N62470-93-D-3033

1.0 INTRODUCTION

ICHOR Services, Inc. (ICHOR), as a subcontractor to J.A. Jones Environmental Services Company (J.A. Jones), is submitting this Work Plan for remediation of subsurface petroleum contamination at Tank Farm B, Marine Corps Air Station (MCAS), Cherry Point, North Carolina, Delivery Order No. 0017 (D.O. No. 0017). Remediation of Tank Farm B will be completed in a two-phased approach. Phase I will focus on removal of free product and cleanup of soil contamination in the vadose zone. Phase II activities will seek to complete secondary source removal and groundwater remediation. This project and associated Work Plan will address only Phase I remediation activities. The Delivery Order consists of construction of product recovery and soil vapor extraction (SVE) systems designed to recover both free phase product and product vapor from the Tank Farm B area. Construction will include the installation of product recovery and SVE wells, associated piping network, equipment building, and product recovery and SVE equipment.

Section 1.0 of this Work Plan presents the Basis of Design, scope of work, and project schedule. Section 2.0 is a sampling and analysis plan. Section 3.0 is the waste stream management plan for the project construction activities. Section 4.0 presents the environmental protection plan for the project. The Site Health and Safety Plan is presented in Section 5.0. Section 6.0 outlines project quality control (QC) procedures. Section 7.0 contains a list of Contractor generated technical specifications. Contractor generated drawings can be found in Section 8.0. Section 9.0 provides a list of references utilized in the preparation of this work plan.

The construction schedule is presented in Appendix A. The Sediment and Erosion Control Plan is presented in Appendix B. Project Technical Specifications are presented in Appendix C and a calculation breif is presented in Appendix D.

1.1 Basis of Design

1.1.1 Project Background

MCAS Cherry Point is located on the Atlantic Coastal Plain near the city of Haveloc, Craven County, North Carolina. The provides flight support and aircraft maintenance services for the Marine Corps. On-site activities include aircraft fueling, maintenance, and storing, engine testing, fuel storage and distribution and vehicle maintenance.

Tank Farm B is located in the northwest quadrant of the Base at the intersection of Roosevelt Boulevard and Sixth Avenue. Tank Farm B encompasses approximately 5 acres and contains seven below ground fuel storage tanks to support base air operations. These tanks have historically contained jet fuel (JP-5), aviation gasoline, and motor vehicle gasoline. An active above-ground piping network is visible along with several small support buildings. An abandoned below grade piping network also traverses crosses the site. Site access is either via a paved entrance road off of Sixth Avenue at the west corner of the tank farm or via a gravel drive at the east side of the site as illustrated in the site plan on Drawing SK-1.

The topography within Tank Farm B is generally flat and turf covered. The center portion of the site has been filled to cover the fuel tanks and is about 5 to ten feet higher than the surrounding grade. Surficial soils in the tank farm consist of fine sands and silt. According to previous reports, the groundwater in the upper aquifer generally flows to the north at a gradient of approximately 0.002.

1.1.2 Site Environmental Conditions

Soil and groundwater beneath Tank Farm B have been contaminated by surface and subsurface release of petroleum products. The petroleum is present in the vadose zone soil, as free product and dissolved in the shallow aquifer.

Environmental investigations of this site conducted by Law Engineering, Inc. from 1991 through 1993, identified three plumes of free floating hydrocarbons and petroleum contaminated groundwater within and adjacent to the tank farm area. Well gauging and sampling conducted by ICHOR in February 1997 indicated movement of the product and dissolved-phase plumes. Recent product thickness measurements suggest that two of the plumes have merged leaving only two larger plumes, "north" and "south" plumes. The free product appears to have leveled and spread out slightly, with minor migration in the direction of groundwater flow to the north. Floating free product thickness in the larger south plume is as much as 4 feet. The maximum measured product thickness in the north plume is less than 1 foot. Drawing SK-1 shows the estimated free product thickness as of January 17, 1997.

Comparison of results of groundwater analytical sampling with previous sampling events indicates a general natural attenuation and/or biodegradation of target contaminant levels in the upper aquifer. Contaminant levels in the lower aquifer have increased slightly but remain below groundwater standards. This indicates a potential downward migration of site groundwater contamination.

The project site has been expanded to include the eastern portion of the Tank 1958 site located directly across Sixth Avenue from Tank Farm B. Results of geoprobe studies conducted at the Tank 1958 site and information obtained from a new monitoring well suggest that contamination from Tank Farm B has migrated into this area.

1.1.3 Project Objectives

The objective of the project is to extract recoverable free product and to remove contaminants from vadose zone soils. The project remediation objectives have been further defined to include:

- Extract recoverable free product to reduce product thickness to less than 0.01 feet (1/8 inch),
- Protect receptors such as Slocum Creek and existing water wells,
- Restore petroleum contaminated soil in the vadose zone to below target cleanup levels (10 mg/kg TPH gasoline and 40 mg/kg TPH diesel), and
- Restore contaminated groundwater in the surficial unconfined aquifer beneath and in the vicinity of Tank Farm B to levels of quality consistent with applicable North Carolina regulatory guidelines and standards, or to levels achievable by conventional remediation technology.

1.1.4 Remedial Action Plan

Remediation of Tank Farm B will be accomplished through a two-phase approach. Phase I will focus on primary (free product) and secondary (vadose contamination) source removal while Phase II activities will seek to complete secondary source removal and groundwater remediation through reliance upon natural attenuation processes. Phase I is consistent with the existing Corrective Action Plan[1] (CAP) prepared by Law and therefore may begin without further modification of the CAP. Implementation of Phase II will require approval of modification to the existing CAP. This Work Plan addresses only the Phase I remediation.

1.1.4.1 Phase I Remediation

Phase I will include aggressive removal of free product and vadose contamination. The primary component of the Phase I remediation system is the installation of a series of vertical free product recovery wells placed throughout the product plumes where product thickness is greater than 0.5 feet thick. Wells will be concentrated on the down gradient perimeter of the plumes and in thicker portions of the plumes.

Concurrent with installation of the product recovery wells, a series of shallow soil vapor extraction (SVE) wells will be installed to remove vapor phase hydrocarbons from the vadose zone. SVE will utilize shallow vertical wells to which a vacuum will be applied. SVE wells are relied upon to remove soil contamination and further reduce remaining floating free product thickness. SVE wells will be located in areas within the product plumes in addition to the three areas designated in the CAP for soil flushing.

---

[1] Final Corrective Action Plan, Tank Farm B, Marine Corps Air Station, Cherry Point, North Carolina, Law Engineering, Inc., October 13, 1993, (Contract Nos. N62470-93-D-7625/0001 and N62270-90-D-7625/0005)

1.1.4.2 Phase II Remediation

Phase II will include remediation of dissolved-phase contamination at Tank Farm B by natural processes of degradation and attenuation. These processes include biodegradation, dispersion, volatilization and adsorption and are refereed to as intrinsic remediation. Implementation of Phase II will require modification of the existing CAP. Phase II will include a monitoring program consisting of 12 wells to be monitored quarterly. The wells are to be placed down gradient of and within Tank Farm B contamination areas to monitor migration of the plumes and determine the effectiveness of the remediation system.

1.1.5 Phase I Components

1.1.5.1 Free Product Recovery

The layout of the free product recovery system is shown on Drawings C-1 and C-2 . In general, a total of 28 free product recovery wells will be installed to depths ranging from 20 to 25 feet below the ground surface. Recovery wells will be spaced approximately 35 feet apart along the down gradient perimeter of each of the product plumes. Spacing is increased to approximately 35 feet in the interior of the plumes.

Recovery wells are to be 6-inch diameter PVC installed in a 12-inch diameter boring. Belt-type product skimmers will be used for product extraction in each recovery well. Product will be gravity discharged into a holding sump and a transfer pump is used to convey product via buried nitrile rubber hose to the equipment building for processing. A below grade vault will be installed at each wellhead to house the belt skimmers and transfer unit. Belt skimmers and transfer pumps will operate on 120 volt single phase power and components in the vaults will be explosion-proof suitable for hazardous environment. Electrical skimmers and transfer pumps were selected over pneumatic systems based on capital cost and required maintenance. Electrical supply for belt skimmer operation will be placed in buried conduit. Conduit will be explosion proof within 10 feet of the building and each vault. Conduit will be encased on concrete where the conduit crosses beneath roads.

Underground hose to carry product from the wells to the equipment building will be secondary contained. Buna-N hose product lines will be placed within a PVC secondary containment pipe. Electrical conduit to the wells will be placed in the same trench as the product pipe.

The equipment building is centrally located and will house the electrical power distribution and controls, and equipment for the product recovery system and SVE system. Product will be collected and physically separated from nuisance groundwater in a 40 gpm oil/water separator and routed to the product storage tank. The product storage tank will be located on the containment pad adjacent the building and will be double wall steel construction. Close coupled centrifugal electrically driven pumps are used to transfer product to the storage tank and water to the effluent storage tank located in the building. The effluent tank will be single wall construction. The truck loading basin is designed to contain 110 percent of the product storage tank capacity (1.1 times 2,000 gallons). A sump is located in the pad to collect and transfer

spillage to the oil/water separator. A plan of the equipment building and containment pad is shown on Drawing C-2.

The equipment building will be used for enclosure of the process equipment and SVE blower system equipment. The purpose of the building is to shield the equipment from weather and to provide freeze protection for piping. The building will be 12 feet wide by 20 feet long having a minimum inside clearance of 12 feet. The building will be of concrete block construction with Carolina Red brick veneer exterior constructed on a cast-in-place concrete slab. The roof system will be wood frame rafters forming the hip roof line to conform to the base architectural standards with single cover. The building will be equipped with a man-door, a roll-up door and loading ramp for equipment installation, interior and exterior lighting, ceiling insulation and a minimal heating system. The building will contain a thermostatically controlled powered roof mounted exhaust vent and power activated intake louvers for cooling.

1.1.5.2 Soil Vapor Extraction System

Phase I remediation will also involve the extraction of volatile petroleum hydrocarbons from vadose soils. The purpose of the SVE system is to enhance the volatilization and biodregradation of volatile and semi-volatile compounds. The SVE system will consist of 30 shallow vertical wells connected to a manifold piping network leading to a central blower used to generate required vacuum housed in the equipment building. In the building, a moisture chamber will remove moisture from the air stream prior to entering the blower, a particulate filter will remove damaging particulate and a discharge silencer will be installed to control noise levels. When necessary, accumulated moisture collected in the moisture chamber will be delivered to the effluent tank. The SVE blower will be direct vented to the outside through the roof of the building. Vapors extracted from the subsurface will be discharged directly to the atmosphere from the vacuum blower.

The SVE well spacing (35 feet) was derived from SVE pilot test data. A SVE pilot study was conducted by Law Environmental, Inc. (LAW) at Tank Farm B in March 1997. The data from this test, along with subsequent calculations, are contained in Appendix D. Based on results of the pilot test, it is estimated that the radius of influence of each SVE well will range from approximately 35 to 45 feet. The total volumetric flow rate for the combined SVE system is estimated to be 16 cubic feet per minute (cf.) with a vacuum of 2.5 inches of mercury applied at each well.

The layout of the SVE system is shown on Drawing C-2. SVE wells are constructed of 2-inch diameter casing installed in a 6-inch diameter boring. SVE wells will be installed to within 1 foot of the seasonal high water table. Well depths are anticipated to range between 8 and 14 feet. PVC manifold piping will connect each of the SVE wells to the central vacuum blower which will draw air and volatile contaminants from the soil. A valve will be located in the vacuum line at each SVE well head to control flow and vacuum of each well. A sample port and quick-connect branch will be installed at each well head for air sampling and pressure monitoring. At locations where SVE wells coexist with product recovery wells, both wells will be accessed through the same vault.

1.1.5.3 Electrical Systems

Power requirements are 480V, 3 phase for the SVE blower, and 120/240V, single phase sub-distribution for belt skimmers, small motors, pumps, exhaust fan, lighting and receptacle loads. Control wiring is not required for the belt skimmers or transfer pumps at the well heads. A transformer will be located adjacent the equipment building.

The building and vaults are considered to be Class 1, Division 1, Group D hazardous atmosphere. All wiring within 10 feet of these structures will be in rigid steel conduit with explosion proof fittings. Electrical panels, starters, switches, etc. will be Class 1, Division 1, Group D rated.

The control system consists of a single control panel located within the equipment building linked to a series of sensors located throughout the system. Water level control sensing will be accomplished using float switches linked to intrinsically safe circuits. While operating under normal conditions, pumps in the oil/water separator sumps will be activated on "Hi" condition and deactivated on "Lo" condition. High level in either the product tank or water effluent tank will activate a warning alarm and lockout transfer pumps and shutoff power to the belt skimmers. The exhaust fan is thermostatically controlled. The inlet louvers are power operated and linked to exhaust fan operation.

1.1.5.3 Sequence of Operation

This Work Plan covers only Phase I remediation activities. Initially free product recovery will be emphasized. Belt skimmers in the free product recovery wells will operate and deliver a mixture of free product and water to the oil/water separator. Belt skimmers operate on built-in timers. Timers will be adjusted periodically as product thickness decreases to minimize collection of nuisance water. Oil and water will be pumped to separate storage tanks from the oil/water separator. Nuisance groundwater and storm water collected and removed from the product stream will be stored in the effluent tank for eventual disposal at either the Base treatment facilities or at a permitted off-site facility based on results of analytical sampling. Product collected in the storage tank will be removed by a disposal contractor or Base recycling personnel when necessary.

Initially, the product recovery system and SVE system will be operated concurrently. If monitoring indicates that operation of the SVE system is interfering with free product recovery efforts, SVE flow rates may be adjusted downward or SVE may be delayed in specific areas until free product removal is complete. SVE wells outside of the free product recovery areas will be operated. Details of system startup and operation are discussed in subsequent sections of the Work Plan.

1.2 SCOPE OF WORK

The following construction activities will be conducted by ICHOR at the MCAS Cherry Point site.

- PRODUCT RECOVERY AND SVE WELL INSTALLATION
- PIPING SYSTEM INSTALLATION
- INSTALLATION OF WELL OIL SKIMMERS
- BUILDING CONSTRUCTION
- OIL TRANSPORT TRUCK LOADING BASIN CONSTRUCTION
- PRODUCT RECOVERY AND SVE EQUIPMENT INSTALLATION
- ELECTRICAL SYSTEM INSTALLATION
- SYSTEMS TESTING
- SITE RESTORATION
- OPERATION AND MAINTENANCE
- DEMOBILIZATION

1.2.1 Preliminary Site Activities

1.2.1.1 Preconstruction Plans

Prior to mobilizing for construction, an Excavation Plan and Hurricane Readiness Plan will be prepared and submitted to the ROICC for review and approval. No construction activities will begin without prior approval of these plans.

1.2.1.2 Utility Reconnaissance

Prior to the start of construction activities, ICHOR will undertake a utility reconnaissance survey to locate active and abandoned underground and aboveground utility lines at Tank Farm B. The survey will include review of available documentation such as design and as-built construction drawings from previous work at the site, consultation with base personnel, and actual field investigations. Utility lines will be marked in accordance with industry accepted indicators.

1.2.2 Mobilization

Mobilization activities will include delivery and set-up of a field office trailer, connection of temporary utilities to the trailer, and delivery to the site of materials necessary for site preparation. The field office trailer will be at a location onsite to be determined in coordination with the NTR. Temporary utility hook-ups will be established by contacting the base Facilities Maintenance office and the NTR.

The field office trailer will have a sign which provides the information required by the contract documents. This information will include company identification, contract number, telephone contact numbers, and emergency telephone numbers.

1.2.3 Site Preparation

Site preparation will include the installation of erosion and sediment control measures, traffic controls, lay-down areas for supplies, soil stockpile areas, and decontamination areas.

Erosion and sediment control measures will consist of sediment fence, construction entrance, dust suppressers, and temporary seeding. All measures will be installed in accordance with the approved Erosion and Sedimentation Control Plan. A copy of the plan is provided in Appendix B.

Traffic controls will be installed to restrict and direct traffic access through the work area. Controls will consist of traffic cones, barrels, plastic warning tape, and signs. Controls will be installed on an as-needed, where needed basis.

Lay-down areas for supply storage will be delineated in consultation with the NTR, Fuel's Department and Environmental Affairs Department (EAD) at the project site. Appropriate protection measures, such as temporary fencing, will be installed to prevent damage to materials during storage and to protect base personnel from possible injury.

The locations of soil stockpile and roll-off storage areas will be coordinated with the NTR, Fuel's Department and EAD. Stockpile areas of excavated material will have sediment fence installed around their perimeters to prevent sediment runoff into adjacent watercourses. The excavated soil will be placed on an impervious barrier to prevent contamination from leaching into clean soil. The piles will be covered at all times to minimize erosion and prevent infiltration of rain water.

Roll-off containers will be lined and tarped. The roll-off containers will be marked "Pending Analysis" until characterization of the materials is completed.

It is recognized that Tank Farm B is a functional facility and a base programming priority. ICHOR will coordinate its work with the NTR, Fuel's Department and EAD to maintain access to the site and facilities at all times.

Decontamination areas will be constructed for heavy equipment, small equipment and tools, and personnel. The locations of the decontamination areas will be coordinated with the NTR, Fuel's Department and EAD at the site.

1.3.4 Product Recovery and SVE Well Installation

Twenty-eight (28) product recovery wells and thirty-five (35) SVE wells will be installed at the project site. The locations of these wells are shown on the revised Site Plan SK-1. The wells will be installed by ICHOR in accordance with Sections 01010, 02222, 02223, 02900, and 02901 of the contract documents and North Carolina Department of Environment, Health & Natural Resources "2C" regulations. ICHOR will obtain permits for the recovery and SVE wells in accordance with state regulations.

ICHOR personnel will establish the location of each well based on the contract Drawing Nos. C-3 and C-4, ICHOR Drawing No. SK-1, and existing site conditions. The exact location of the well will be marked as to avoid existing facilities, underground and aboveground utility lines, and proposed piping systems. Well locations will be coordinated with the NTR, Fuel's Department and EAD. ICHOR will obtain numbers for the wells in accordance with MCAS regulations and provide EAD with a list of wells installed and utilized.

Well installation will be in accordance the EPA Water Well Construction Manual under the direction of registered professional engineer or geologist.

The product recovery wells will have a minimum drill hole diameter of 12 inches. The 6-inch diameter well casing and screen will be placed concentricity in the drill hole. The casing material will be Schedule 40 PVC pipe. The screen will consist of circumferentially continuously slotted Schedule 40 PVC. The well screen opening size will be determined by examination of the grain size of the soil material in the screened zone. In order to expedite procurement of the screen, existing drilling information will be examined and, if appropriate, the information utilized in sizing the screen opening.

The filter pack for each well will be in accordance with Section 02900 of the contract specifications. The filter pack material will be placed using a tremie pipe. Care shall be taken to prevent bridging and to allow for settlement of the filter pack. Casing centralizers will be used as necessary to maintain alignment of the well during placement of the filter pack.

A 1.0 foot thick bentonite seal will be placed above the filter pack. The bentonite pellets will be placed in the auger hole and portable water added at 10 minute intervals to hydrate the seal. The manufacturer's recommendation for hydration will be followed. The annular space above the bentonite seal will be grouted up to ground level. Placement of the neat cement grout will be with by tremie methods.

Recovery wells will be developed by air surging and periodic air pumping. Development will be performed until the extracted groundwater is clear and sediment free. Groundwater from development activities will be collected and stored in double walled containers or within secondary containment. The water will be sampled in accordance with Section 2.0 of this document. Disposal will be in accordance with Section 3.0 of this work plan.

The SVE wells will have a minimum drill hole diameter of 6 inches. The 2-inch diameter well casing and screen will be placed concentricity in the drill hole. The casing material will be Schedule 40 PVC pipe. The screen will consist of circumferentially continuously slotted Schedule 40 PVC.

The filter pack for each well will be in accordance with Section 02901 of the contract specifications. The filter pack material will be placed using a tremie pipe. Care shall be taken to prevent bridging and to allow for settlement of the filter pack.

During well installation activities, workers will be required to wear appropriate personal protective equipment in accordance with the Site Health and Safety Plan. The anticipated protection requirement is Level D modified.

Drill cuttings from well installation will be collected in roll-off containers. The roll-off containers will be double lined and will be tarped at all times. The containers will stored at a location to be coordinated with the NTR, Fuel's Department and EAD. The roll-off containers will be marked "Pending Analysis" until characterization of the materials is completed. Sampling of the material will be performed in accordance with Section 2.0 of this plan. Characterization and disposal of the material will be in accordance with Section 3.0 of this document.

A wellhead will be constructed around the top of each well casing as shown on Drawing No. C-9. A pre-cast concrete frame will be installed on an ASTM C33 No. 57 stone base. The concrete frame will have a steel frame and lid with hydraulically assisted access doors. The well wault and lids will be designed to support an AASHTO H20 wheel load.

ICHOR Site Quality Administrator (SQA) will observe each step of the recovery and SVE well installation. The SQA will maintain all necessary field documentation including quality control testing results.

1.3.5 Piping System Installation

Trenching for product and SVE piping will be completed concurrent with well installation. The trenching will be performed to a depth of 2.5 feet below land surface. Horizontal boring will be done in lieu of trenching across Sixth Street. Excavation activities will be supervised by ICHOR personnel for evidence of undetected utilities and POL contaminated soil. Uncovered utilities will be addressed as appropriate in the field. Marked utilities in the excavation areas will be excavated around with hand tools. The trenches will be constructed as shown on Drawing Nos. C-3, C-4 and C-9 through C-13, ICHOR Drawing Nos. C-1 through C-3, and in accordance with the following technical specifications of the contract documents:

- 01010 General Paragraphs
- 01561 Erosion And Sediment Control
- 02220 General Excavation, Filling, And Backfilling
- 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
- 02223 Transportation and Disposal of Contaminated Material
- 02900 Product Recovery System
- 02901 SVE System
- 03302 Cast-In-Place Concrete
- 05500 Metal Fabrications
- 15011 Mechanical General Requirements
- 15400 Plumbing Systems
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work

If rainfall events occur during excavation activities, standing water will be removed by pumping from the trench before placing of materials or backfilling. Standing water will be filtered through a dewatering structure, as discussed in the Erosion and Sediment Control Plan included in Appendix D of this Work Plan, from areas known to be uncontaminated by POL. In areas of known POL contamination or where a sheen is visible on the water, oil booms will be used to remove the product. This product will be containerized, properly labeled, sampled/analyzed, and disposed of off-site (Sections 2.0 and 3.0). Standing water from the excavations will be discharged to existing oil/water separators at the site with the ROICC's approval, under advisement from EAD.

Based on previous soil boring samples, soil generated during excavation is anticipated by the Navy to be clean. As a precaution excavated soil will be screened with an organic vapor detector (OVD), field tested for Total Petroleum Hydrocarbons (TPH), segregated and stockpiled onsite, or used as backfill.

Petroleum contaminated soil will not be used as backfill material. Petroleum contaminated soil will be segregated from non-petroleum contaminated soil and stockpiled on and covered with two layers of 6 mil poly liner or placed in double lined roll-off containers. Soil stockpiles will be constructed as shown on Drawing C-5. Sampling of the material will be performed in accordance with Section 2.0 of this plan. Characterization and disposal of the material will be in accordance with Section 3.0 of this document.

Non-petroleum contaminated soil stockpiles, which will not be returned to the excavation by the end of the shift, will be covered with two layers of 6 mil poly liner to reduce moisture content increases due to rainfall events to facilitate backfilling. Soil Stockpiles will be constructed as shown on Drawing C-5.

During the excavation, backfill and site restoration of the trenches, the SQA will observe all phases of the work to insure compliance with the specifications. Where applicable, the SQA will perform construction testing in accordance with the contract documents.

1.3.6 Installation of Well Oil Skimmers

Each product recovery well will include a well oil skimmer installed within the well vault. The skimmer is equipped with a product collection belt that extends into the well. The skimmer and its appurtenances will be installed by ICHOR in accordance with Drawing No. *C-3* and the following sections of the contract specifications:

- 01010 General Paragraphs
- 02900 Product Recovery System
- 15011 Mechanical General Requirements
- 15400 Plumbing Systems

Connections from the skimmer to the pipe system will be made through the bottom of the wellhead's No. 57 stone.

Prior to actual construction, ICHOR will "dry fit" the well head components to determine the optimum placement of each item in the vault.

1.3.7 Equipment Building Construction

ICHOR will construct the equipment building at Tank Farm B to house the system components. Construction of the structure will occur concurrently with piping system and well installation. The building is a concrete masonry unit structure with a Red Carolina Brick exterior. The building will be constructed in accordance with contract Drawing Nos. A-1, A-2, S-2, S-3, M-1 and M-2, ICHOR Drawing Nos. A-1, A-2, and M-1, and the following sections of the contract specifications:

- 01010 General Paragraphs
- 01561 Erosion & Sediment Control
- 02220 General Excavation, Filling, And Backfilling
- 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
- 02223 Transportation and Disposal of Contaminated Material
- 03302 Cast-In-Place Concrete
- 04200 Unit Masonry
- 05500 Metal Fabrications
- 06100 Rough Carpentry
- 06200 Finish Carpentry
- 07112 Bituminous Dampproofing

- 07339 Roof Insulation
- 07311 Asphalt Shingles
- 07600 Flashing And Sheet Metal
- 07920 Joint Sealants
- 08110 Steel Doors And Frames
- 08331 Rolling Service Doors
- 08710 Finish Hardware
- 10201 Metal Louvers
- 15011 Mechanical General Requirements
- 15400 Plumbing Systems
- 15501 Heating And Ventilating System
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work
- 16402 Interior Wiring Systems
- 16510 Interior Lighting
- 16670 Lightening Protection System

ICHOR personnel will perform excavation and installation of the building footings and concrete slab floor. The area will be excavated by a backhoe or other equipment to depths of approximately 3 feet maximum. Pipe system components and underground electrical system components will be installed. Appropriate backfill material will be placed and compacted. Formwork will then be constructed for the footings and slab. Reinforcement will be placed for the concrete. Concrete will then be placed in the formwork. Forms will not be removed for at least 48 hours.

ICHOR and/or its subcontractors will construct the concrete masonary unit building structure. The building will have a Carolina Red Brick veneer in accordance with the Base Architectural Plan. A steel rollup door and steel mandoor will be installed. A wood frame roof system with asphalt shingles will be installed on the structure. A fire rated ceiling will be installed to support installation of insulation.

Mechanical equipment such as ventilation louvers, roof vents and exhaust stacks will be installed concurrent with building construction.

Interior and exterior wiring and lighting will be installed during construction of the equipment building. Electrical wiring for the treatment system components will be completed during equipment installation.

The SQA will conduct and/or observe all required construction quality assurance testing for the building construction including compaction, concrete sampling, and electrical service.

1.3.8 Oil Transport Truck Loading Basin Construction

The oil transport truck loading basin will be constructed adjacent to the equipment building. Construction of the oil transport loading basin will be in accordance with Drawing No. S-1 and the following sections of the contract specifications:

- 01010 General Paragraphs
- 01561 Erosion & Sediment Control
- 02220 General Excavation, Filling, And Backfilling
- 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
- 02223 Transportation and Disposal of Contaminated Material
- 03302 Cast-In-Place Concrete
- 05500 Metal Fabrications
- 07920 Joint Sealants
- 15011 Mechanical General Requirements
- 15400 Plumbing Systems
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work

Work will begin with the excavation of soil to a depth of approximately 2 feet and placement of subbase material for the concrete slab. Formwork for the truck loading basin will then be constructed and concrete reinforcement installed as shown on the contract drawings. Concrete will be poured and allowed to set for 48 hours prior to form removal.

The SQA will conduct and/or observe all required construction quality assurance testing for the construction including compaction and concrete sampling.

1.3.9 Recovery and SVE Equipment Installation

Upon completion of construction of the equipment building, the product recovery and SVE equipment will be installed in the structure. Major components will include an oil/water separator, transfer pumps, product and nuisance water storage tanks, and an SVE blower. In addition, the mechanical, plumbing and electrical systems will be installed in the building. Construction will be in accordance with contract Drawing Nos. C-6, C-7, C-8 and I-1, ICHOR Drawing Nos. C-2 and C-3, and the following contract specifications:

- 01010 General Paragraphs
- 11302 Packed, Gravity Oil-Water Separator
- 11303 Pumps: Water, Centrifugal
- 13205 Aboveground Storage Tank
- 13321 Flow Measuring Equipment

- 15011 Mechanical General Requirements
- 15400 Plumbing Systems
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work

1.3.10 Electrical System Installation

The electrical system includes both the service connection to the base electrical supply, equipment building wiring, and lines to the well oil skimmers. Installation of electrical equipment will be in accordance with Sections 16011, 16301, 16402 and 16510 of the contract specifications and contract Drawing Nos. E-1 through E-7 and I-1, ICHOR Drawing Nos. E-1 through E-5.

Electrical service will be obtained at Building No. 73. The service line will be placed in a buried conduit until reaching the treatment building. Conduits will be encased in concrete under roads and structures. A transformer will be installed at the equipment building to step down power.

1.3.11 Systems Testing

When the installation of the system components in the equipment building is complete, system testing will be performed. System testing will include leak testing of product recovery and SVE piping. To the extent practical, piping will be testing in sections prior to backfilling. The well oil skimmers and SVE pump will be tested for proper operation and adjusted during system startup. Testing will be performed by or under the direct supervision of ICHOR's SQA.

The appropriate paragraphs of the following contract specifications will be utilized in system testing:

- 01010 General Paragraphs
- 02900 Free Product Recovery System
- 02901 SVE System
- 11302 Packed, Gravity Oil-Water Separator
- 13205 Aboveground Storage Tank
- 13321 Flow Measuring Equipment
- 15011 Mechanical General Requirements
- 15400 Plumbing Systems
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work

In addition, information provided by the manufacturers of the equipment will be utilized to test proper operation of the equipment.

1.3.12 Site Restoration

Site restoration will include backfilling and seeding of the piping trenches and disturbed areas, removal of E&S controls, and pavement restoration, as necessary. Site restoration will be in accordance with Section 02220 of the contract documents.

Backfill will be placed in accordance with the contract documents. Compaction testing will be performed by or under the direct observation of the SQA.

Seeding will be in accordance with the approved Erosion Control Plan, state regulations, and Section 02220 of the contract documents. Appropriate levels of vegetative coverage will be developed prior to removal of the E&S controls.

It is anticipated that pavement restoration will be limited to gravel roadway areas. These areas will be restored in accordance with Section 02220 of the contract documents.

1.3.13 Systems Start-Up

Start-up of the product recovery and SVE systems will commence upon completion of construction and testing activities. Start-up of the product recovery system will begin with priming of all system components with potable water. This will permit adjustment of the components without any delays.

Each belt skimmer will be started individually and observed for proper operation. Adjustments, as necessary, will be made to the unit.

The oil/water separator will be observed for proper operation. Float sensors will be adjusted and the transfer pumps will be tested.

Upon completion of start-up of all the belt skimmer units, the product and nuisance water storage tank float sensors will be adjusted as necessary. The sensors will be tested to ascertain proper operation i.e. shutdown of the product recovery system upon reaching the high level setting in each tank.

The SVE system start-up will consist of bringing the SVE blower on-line and adjusting the flow rate at each well head to meet the requirements of the SVE pilot study conducted by Law Engineering. The optimum rate of flow is 16 cfm at 2.5 inches Hg.

1.3.14 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.

1.3.15 Operation and Maintenance

Operation and maintenance of the product recovery and SVE systems will be conducted under D.O. 0017 by ICHOR for a period of 180 days following system startup. Operation and maintenance of the individual recovery system components will be conducted pursuant to the manufacturers recommendations and the plans and specifications. A Concept Submittal will be prepared in accordance with Section 01783 of the contract documents. This submittal will be provided to the NTR 45 calendar days after the notice to proceed. The Concept Submittal will present the overall plan to be followed during ongoing preparation of the manual.

A Preliminary Submittal of an Operations and Maintenance (O&M) Manual will be submitted 90 calendar days prior to construction completion date. This submission will include the detailed development of each section of the manual. A Prefinal O&M Manual will be submitted to the NTR one calendar day prior to commencement of the operational period. The Final Submittal of the O&M Manual will be at the end of the operational period. The Final Submittal of the manual will address all previous review comments as well as changes made and problems discovered during facility start-up.

Training for MCAS personnel and/or an O&M contractor will be performed at the end of ICHOR' O&M period. Manufacturers' representatives will be available to train personnel in the operation of their respective units of the treatment system. Training will be in accordance with the applicable sections of the contract documents.

1.4 CONSTRUCTION SCHEDULE

Work activities will be completed in accordance with the Construction Schedule included as Appendix A. In summary, construction activities will be completed as follows:

• Mobilzation and Site Preparation	1 week
• Product Recovery and SVE Well Installation	4 weeks
• Piping System Installation	4 weeks
• Installation of Well Oil Skimmers	1 week
• Building Construction	4 weeks
• Oil Transport Truck Loading Basin Construction	4 weeks
• Product Recovery and SVE Equipment Installation	2 weeks
• Electrical System Installation	4 weeks
• Systems Testing	1 week
• Site Restoration	1 week
• Operation and Maintenance	26 weeks
• Demobilization	1 week

It should be noted many of the above tasks will be performed simultaneously.

2.0 SAMPLING, ANALYSIS AND TESTING PLAN

This Plan outlines the required sampling, analysis and testing of soil, water, construction debris, and construction materials for the completion of D.O. 0017. As discussed in Section 1. of this document, the Work Plan covers only Phase 1 of the remediation efforts for the project site. Accordingly, sampling. Analysis and testing discussed herein applies only to Phase 1 construction, operation, and maintenance activities.

2.1 CHEMICAL SAMPLING AND ANALYSIS

This plan has been developed in accordance with the requirements of the following documents:

- [CAP] Final Report Of Underground Fuel Investigation, Comprehensive Site Assessment and Corrective Action Plan For Tank Farm B, Volume IV, Marine Corps Air Station, Cherry Point, North Carolina, Law Engineering, Inc., Raleigh, North Carolina, October 13, 1993.

- [State Guidelines] Groundwater Section Guidelines For The Investigation and Remediation of Soils and Groundwater, North Carolina Department of Environment, Health, and Natural Resources, Division of Environmental Management, Groundwater Section, March 1993 (with June 1993 Revisions incorporated).

- [Technical Specifications] NAVFAC Specification No. 05944832, Remediation Of Subsurface Petroleum Contamination At Tank Farm B, MCAS, Cherry Point, North Carolina, ICHOR Services, Inc., Pittsburgh, Pennsylvania, June 20, 1997.

Based on the CAP prepared for the site, the soil and groundwater are contaminated with petroleum hydrocarbon compounds resulting from both high boiling point fuels (principally related to JP-5 currently and historically handled at the site) and low boiling point fuels (apparently related to gasoline historically handled at the site). Also, lead contamination (apparently related to gasoline contamination) has been detected at the site.

Sampling and analysis for D.O. 0017 are summarized in Table 2-1. The following sections detail the required sampling and analysis. Note that, in some instances, the CAP, State Guidelines, and Technical Specifications have differing requirements. In such instances, this the Sampling and Analysis Plan detailed herein followed the requirements of the CAP. Similarly, the State Guidelines were given precedence over the Technical Specifications.

2.1.1 Sampling Strategy

The goal of this sampling program is to collect representative samples of the media to be analyzed. The personnel responsible for the sampling activity will investigate and understand the need for, and requirements of, the sampling program.

The following strategies have been identified for soil, water, and construction debris sampling for D.O. 0017:

- Soil Disposal Sampling: Soil disposal sampling will be completed by collecting composite soil samples from soil stockpiled as a result of drilling and trenching activities. Disposal sampling will be completed following stockpiling because contaminated soil will not be generated at a rate to facilitate direct loading. Also, some "stockpiles" will be excavated material placed adjacent to open trenches for testing prior to use as "clean" fill (i.e. soil having TPH[GRO&DRO] levels less than 10 ppm). Analytical testing parameters will be based on disposal facility requirements and are expected to include TPH-GRO, TPH-DRO, and lead.

- Waste Water Sampling: Waste water generated during construction activities will be containerized and sampled for characterization and disposal parameters required by the disposal facility. Waste waters will include water pumped from open excavations, well development water, water discharged from the treatment system during startup and testing and water generated by personal and equipment decontamination. Typically, water will be tested only for cleanup parameters as identified in the CAP. Specifically, the CAP identifies purgeable aromatic compounds (per EPA Method 602) for monitoring of cleanup endpoints and testing for those compounds will be the basis for waste water characterization. Also, based upon historic handling of gasoline at the site, water will also be tested for lead.

- Effluent Sampling. Water samples will be collected from the nuisance water storage tank to verify the overall performance of the system and for disposal facility requirements. It is anticipated nuisance water will be transported to the Base Industrial Wastewater Treatment Plant (IWTP) for treatment and disposal. Sampling will include analysis for the design parameters of the IWTP.

- Process Air: Process air from the soil vapor extraction system will be collected to verify system effectiveness. Samples will be analyzed for BTEX (per EPA Method 18).

- Process Wastes: Process wastes will include sludges and solids generated by the system. Typically, sludges and solids will be generated during cleaning of the system oil/water separator. Process wastes will have analyses completed for RCRA target compound list and as such include a full TLCP, ignitibility, corrosivity, and reactivity.

- Quality Control Samples: Quality Control (QC) samples will be collected during each sampling event as required by the CAP. QC samples will include trip blanks, sampling equipment rinsate blanks, and duplicates. QC samples will be collected only for events associated with performance of the treatment system (i.e. process sampling and effluent sampling events). QC samples will be analyzed by the same methods as other samples.

2.1.2 Sampling Methodologies

Sample containers will be provided by the laboratory to perform the analysis. Per State Guidelines, the samples will preferably be placed in glass containers. The laboratory will also provide shipping containers and custody seals for each shipping container. The laboratory will be responsible for determination of required sample volume. The laboratory will be responsible for determination and supply of preservatives, including any limitations on air freight shipping. Sample containers will be kept closed until immediately before placement of the sample into the container.

Collection of samples will be completed by personnel wearing unpowdered, disposable gloves constructed of Latex or Nitrile. A new pair of disposable gloves will be worn each time a different location is sampled, and gloves will be donned immediately prior to sampling. Samples will be directly placed in sample containers whenever possible. The samples will be immediately placed into an environment maintained at 4 degree Celsius (i.e., cooler with ice or refrigerator).

Collection equipment and monitoring instruments will be constructed of Teflon, stainless steel, or glass that has been decontaminated prior to use by the procedure identified on Figure 2-1.

Collection of water samples will involve special handling of septum-sealed vials (i.e., VOC sample containers). The vial will be filled so that the sample surface is above the container rim (i.e., convex meniscus) and the lid quickly applied so there are no air bubbles. Extreme caution will be exercised when filling the vial to avoid any turbulence which could produce volatilization. The sample will be carefully poured down the side of the vial to minimize turbulence. If air bubbles occur, the lid will be removed, additional sample added, and the lid re-applied (and repeated until no air bubbles are present).

Wastes (i.e. gloves, disposable sampling equipment, decontamination fluids, purge water, etc.) generated by sampling efforts will be collected and disposed of in accordance with the Waste Stream Management Plan in Section 3.0.

2.1.2.1 Samples for Waste Characterization

Waste sampling as discussed in this section includes soil, process solids/sludges, and water samples as related to characterization of materials for disposal (including recycling and/or reuse). The intent of the sampling effort will be to take all reasonable efforts to obtain a representative sample of the waste for characterization by analysis.

<u>SOIL PROCESS SOLIDS/SLUDGES</u>

Stockpile soil samples will be collected by using decontaminated sampling equipment to dig to a depth of 12 inches below the surface at the sampling location. The sample will then be collected

by hand with disposable gloves donned immediately prior to collecting the sample or by using equipment decontaminated prior to collecting the sample. The sample will be placed in a pan and thoroughly mixed prior to placement in the sample container. Sample containers will be filled completely and compacted so that no head space remains in the sample container. The container rim will be cleaned of soil and particles so the lid can be sealed and the outside of the container will also be cleaned.

Mixing will be accomplished quickly, but in a manner that effectively combines the sample(s) so that all portions of the mixture can be reasonably considered to contain nearly equal portions of all of the component primary sample(s). Because homogenization will, by its very nature, allow some loss of the most volatile petroleum constituents, care will be taken to minimizing this loss. Loss will be minimized by performing the mixing where there is no wind, the temperature is under 80 degrees Fahrenheit (including the surface or container on or in which the mixing is performed), and out of direct sunlight.

Mixing of samples will be completed by the quartering method. Quartering will involve dividing the soil in the sample pan into quarters, thoroughly mixing each quarter, and then recombining all quarters into the center of the pan. The quartering procedure will be followed several times until the sample is adequately mixed. Sample mixing will be achieved by stirring the material in a circular fashion and occasionally turning the material over.

Compositing of soil samples will involve combining of grab samples from different locations. Individual grab samples combined to make the composite will be of the same volume (typically be in the range of 16 to 32 ounces) and will be thoroughly mixed/combined using the quartering method. Compositing procedures will be implemented for specific circumstances as follows:

- For soil in stockpiles or roll-offs, grab samples will be taken at six locations and composited into one sample. The six locations will be selected so that each location is representative of approximately 1/6 of the pile volume.

- For soil in drums, one grab sample will be collected from each drum and composited into one sample. Note that closed drums shall be accessed using non-sparking techniques and tools. If more than five drums of waste soil are present, five representative drums (for every 25 drums or portions thereof) will be selected and one sample from each of those drums will be grabbed and composited into one sample.

WATER

Water samples will be collected and analyzed for disposal parameters from decontamination, run-on, and well waste water. Water samples will be collected by using decontaminated sampling equipment capable of removing a sample at the water surface. Typically, the sample will be collected using a disposable bailer. Sample collection will be completed by directly pouring from the sampling device into the sample container without allowing the device or hands to touch the rim of the sample container. Each sample container will be filled as completely as

possible with a minimum of 90 percent of the container filled (note VOAs to be completely filled per the procedure outlined in Section 2.1.2). The sample container lid will be immediately placed and tightened.

Collection of the sample will involve special circumstances in the following situations:

- In the event free phase product is present at the sampling location (and in the event product will be disposed separately from the water), absorbent materials will be applied to the liquid surface to allow the collection device to penetrate the water column without contacting product. Also, the sampling will be completed at least 24 hours since the last disturbance of the liquid (i.e. last addition of liquid to the holding tank, etc.) to allow sufficient time for product/water decanting.

- For water in drums, one grab sample will be collected from each drum. Note that closed drums shall be accessed using non-sparking techniques and tools. Individual grab samples will be of the same volume (typically be in the range of 16 to 32 ounces) and will be combined to form a composite sample. The composite will be thoroughly mixed/combined by stirring. If more than five drums of water are present, five representative drums will be selected and one sample from each of those drums will be grabbed and composited into one sample.

- For in-situ water sampling along open excavations, one sample composite will be collected for every 5,000 gallons of water. Each composite sample will involve 5 grab samples collected from the ends and quarter points along the trench.

2.1.2.2 Effluent Water

System water sampling as discussed in this section includes only effluent water samples from the process system. The intent of the sampling effort will be to take all reasonable efforts to obtain a representative sample of the water for analysis. Samples will be collected from permanent ports specifically installed for the purpose of sample collection. Sample ports are to be placed at locations of highly turbulent flow.

For samples collected during startup and testing, samples will be collected so that system run-time prior to sampling is maximized - typically, a minimum run-time of 2 to 4 hours prior to sampling will be achieved. For samples collected during full-scale operation, sample collection will be completed following continuous operation (of both recovery well and process systems) for a minimum of 24 hours.

The sampling port will be fully opened and allowed to flow water for a minimum of one minute prior to collection of the sample. The sample will be collected at a port setting allowing for a flow of less than 500 ml/min (i.e., 0.13 gal/min). Collection of the sample will include collection of data including pH, temperature, conductivity, and appearance (turbidity) immediately prior to

containerization of the sample. Sample collection will be completed by directly pouring from the sample port into the sample container without allowing the port or hands to touch the rim of the sample container. Each sample container will be filled as completely as possible with a minimum of 90 percent of the container filled (note VOAs will be completely filled per the procedure outlined in Section 2.1.2). The sample container lid will be immediately placed and tightened.

2.1.2.3 SVE System Air Quality Sampling

During the SVE system startup period and operation and maintenance period, air quality samples will be collected to monitor the efficiency of the vapor treatment process. The grab samples will be collected at the thermal catalytic oxidizer effluent at the frequency specified in the Technical Specifications,

Air samples for volatile organic compounds will be collected using SUMMA® electroplated stainless steel canisters in accordance with USEPA Method TO-14. Canisters will be provided by the laboratory to perform analytical testing. Canisters will be prepared by the laboratory with a minimum vacuum of 30 inches water and the canister valve will be capped with a threaded plug. The laboratory will affix a label to the canister indicating the final vacuum and date applied. The laboratory will also provide a pre-cleaned stainless steel particulate filter with a fitting to allow for connection of tubing.

Sampling will involve the collection of a grab sample. Before the grab sample is collected, the canister inlet valve will be fitted with the pre-cleaned stainless steel particulate filter provided by the laboratory. A new length of Teflon® tubing will then be attached for the filter. When sampling ports are used to collect the sample, the port will be fully opened and allowed to flow aid (either discharge or intake) for a minimum of one minute prior to attachment of the sampling tubing to the port. For samples collected in the absence of a sampling port, the sampling tubing end will be secured (i.e., via clamps, tape, etc.) to allow for collection of sample within the middle third of the air stream. After tubing attachment/securing, the canister valve will be opened and the canister allowed to fill. After about a minute (when no audible sound of rushing gas can be heard), the valve will be closed and capped. The canister will be provided with a sample identification label in accordance with general labeling procedures.

2.1.3 Sample Handling

Handling of sample containers after completion of sampling will be minimized. Sample containers will be placed into shipping containers as soon as possible. Sample containers will be placed in plastic bags prior to placement into shipping containers. Packing will be provided between containers to avoid breakage. Shipping containers will be sealed with strapping tape to avoid tampering during transport to the laboratory. If shipped by common carrier, documentation (i.e., chain of custody, etc.) will be placed in a sealed plastic bag taped to the inside of the shipping containers.

Samples will be maintained at approximately 4 degrees Celsius during shipping. Shipping containers will be insulated coolers and packed with wet ice (dry ice, blue ice, or chemical cooling packs will not be used). Samples will be delivered or shipped to allow for receipt at the laboratory within 24 hours of packaging.

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".

Samples are not expected to be hazardous substances. If the sample is known, or expected to be a hazardous substance, a sample specific protocol will be developed prior to sample transport. The specific protocol will be in accordance with the requirements of DOT regulations for hazardous materials per 49 CFR Parts 110-119.

The following criteria will be used to determine whether a sample is to be considered a hazardous substance:

- Any sample with visible free phase product, whether a liquid sample with segregated free phase or solid with visible adsorbed free phase, will be considered hazardous.

- Sludges or other residual contents of tanks or other vessels will be considered hazardous.

- Any sample from an area or waste stream known (based on analytical results from prior sampling events) to be RCRA-hazardous per criteria of 40 CFR Part 261 (i.e. ignitability, corrosivity, reactivity, or toxicity characteristic) will be considered hazardous.

- Any sample suspected (in judgment of sampler based visual, nasal, or other observed characteristics) to be RCRA-hazardous per criteria of 40 CFR Part 261 will be considered hazardous.

2.1.4 Analytical Methods

Analytical testing will be completed per methods identified on Table 2-1. Note that the methods are consistent with the State Guidelines. State Guidelines require TPH to be analyzed by the California GC-FID Method. Also, State Guidelines require a specific filtration procedure by the laboratory prior to analysis of water samples for lead.

2.1.5 Field Sampling Quality Control

Quality control samples will be collected during each sampling event as required by the CAP. QC samples will include trip blanks, sampling equipment rinsate blanks, and duplicates. QC samples will be collected only for events associated with performance of the treatment system (i.e. process sampling, effluent sampling, and groundwater sampling events). QC samples will be analyzed by the same methods as other samples.

Quality control of field measurements will include calibration at the start of each sampling day of all field equipment in accordance with equipment manufacturer's recommendations. In addition sample labeling, field documentation, and collection procedures will be observed and reviewed by the site superintendent.

2.1.5.1 Sample Labels

All sample containers will be labeled in advance of sampling activities. The sample label will include a unique sample identification number. 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 completed by the laboratory.

The sample identification number will be of the following form:

Delivery Order - Location - Matrix (liquid(L) or solid/soil(S) or gas(G))

For example, a sample collected under delivery order number DO # 0017 of groundwater from monitoring well MW-1 would have the following identification number:

DO#17-MW1-L

2.1.5.2 Sample Custody and Handling

A chain-of-custody record will be completed for each shipping container of samples. The chain-of-custody record will typically be completed on a carbon-copy form provided by the laboratory. The record will, at a minimum, contain the following:

- Site name and address;
- Full name of sampler;
- Sample identification number for each sample;
- Date and time of collection for each sample;
- Sample matrix (liquid, solid, gas);
- Number of containers for each sample;

- Description of sample location for each sample;
- Required analyses for each sample;
- Preservation for each sample;
- Notation whether samples shipped on ice or not;
- Notation if sample 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.

The preparer of the chain-of-custody form (i.e., sampler) will retain a copy of the form and attach the form to daily field logs for the project.

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 and the shipping container secured with strapping tape and a custody seal. Thus, in the case of the common carrier, two signatures will occur on the final chain-of-custody - one signature by the preparer of 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 denote any breaks to the custody seal of the shipping container and/or damage to the shipping container or sample containers on the chain-of-custody-form - analyses will not be completed if sample seals are compromised.

2.1.5.3 Field Documentation

A Field Activity Daily Log form (FAL) will be completed for each day of sampling. A copy of the form is provided on Figure 2-2. The FAL 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 FAL's will be placed in the project file at the completion of each sampling event. The daily FAL will index and will have attached all other paperwork generated associated with the sampling including well purge logs, equipment calibration sheets, sampling analysis request forms, chain-of-custody forms, and shipping receipts. All information related to the sampling event will be either entered on the FAL or on attached forms. Any extraneous written information not noted on the FAL or attached forms will be attached to the daily FAL.

A single responsible party for field documentation will be designated whenever feasible. For multi-person sampling teams, the party responsible for documentation will be focused on the field documentation effort (i.e., FAL and related forms) and will not be a hands-on participant in collection of samples. The field documentation will include sufficient detail so that the history of each sample is clearly evident from the retained record. Logging of field data will vary widely depending on actual sampling situations. The general intent of logging will be to record sufficient information so that anyone can reconstruct the sampling without reliance on the collector's memory. Data will typically include a detailed description of equipment decontamination procedures, equipment calibration procedures, preparatory purging at each location, inventory of all generated wastes, and disposition of all generated wastes.

A copy of the FAL, included all attachments, will be attached to the Daily Production Report for the work.

2.1.6 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 pertinent certification will be provide by the laboratory prior to completion of any work. At the request of the ROICC or NTR a local laboratory may be used.

The laboratory will also be certified with the North Carolina Department of Environment, Health, and Natural Resources for the analyses to be performed.

QC checks (method blanks, matrix spikes, etc.) will be completed at frequencies established by the test method or the laboratory QA/QC Program, whichever is more stringent. QC checks run by the laboratory concurrent with the analysis of samples will be reported along with the sample results.

2.1.6.1 Laboratory Management of Samples

The laboratory will assign a sample custodian to receive samples. The sample custodian will open the shipping container 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 the sample and reconcile the information on the sample label with the chain-of-custody record. The custodian will assign a laboratory number to each sample (to be denoted on the chain-of-custody), log in the sample in the laboratory logbook, and store the sample in a secured storage room or cabinet until assigned to an analyst for analysis. The sample shall be stored at conditions (i.e. 4 degrees Celsius if appropriate, etc.) 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 completing the chain-of-custody in the event the seal on the shipping container is broken, any discrepancies between the chain-of-custody and sample labels are noted, or any sample container is damaged. Any problems noted by the sample custodian will be resolved with the sampler before the sample is assigned for analysis.

Once the sample is received by the analyst, that person is responsible for its care and custody and that person should be prepared to testify that the sample was in his/her possession, or secured in the laboratory at all times until the analysis was performed.

2.1.6.2 Sample Disposal

The laboratory will dispose of all samples in accordance with the requirements the USEPA. The laboratory will be responsible for determination of whether each individual sample is "hazardous" or "non-hazardous" based upon guidelines established in 40 CFR 260. If deemed a hazardous waste by the laboratory, the sample and sample container will be disposed of at a facility permitted in accordance with the requirements of 40 CFR 264. If deemed a non-hazardous waste by the laboratory, the sample and sample container will be disposed of a solid waste at a facility permitted in accordance with 40 CFR 257.

2.1.6.3 Equipment Decontamination

The laboratory will decontaminate equipment in accordance with procedures established in the QA/QC Program which served as the basis of their certification identified in Section 2.1.3.

2.2 CONSTRUCTION MATERIALS SAMPLING AND TESTING

2.2.1 Concrete

Sampling and testing of concrete will be in accordance with detailed procedures established by the technical specifications. Testing will be completed by a certified testing laboratory for concrete testing with written evidence of certification received prior to concrete placement. Field sampling and testing will be by technicians trained in concrete sampling and testing procedures.

Based on the Technical Specification Section 03302 - *Cast in Place Concrete* the following guidelines for sampling and testing will be followed for D.O. 0017:

- Minimum 28-day compressive strength of 4000 psi by ASTM C873, slump between 2 and 4 inches by ASTM C143, aggregate meeting ASTM C33 Size No. 57 or 67, and air entrainment of 2 to 3 percent per ASTM C231. 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 logged. 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 (per ASTM C143), and entrained air by pressure method (per 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 (i.e., additional water, mixing, etc.) to meet specified criteria subject to the limits of the previously identified holding time.

- Three concrete cylinders will be collected (by ASTM C172) 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).

2.2.2 Backfill and Fill Material Testing

Backfill material test data will be submitted for approval prior to installation of backfill material.

Testing reports will be supplied by the material distributor when backfill material is purchased. Where excavated material is used a sample will be collected and shipped to soils laboratory for physical testing. Fill and backfill material will be tested in accordance with Section 02220, Paragraph 3.8.2 of the Technical Specifications.

Density tests will be performed on in place backfill material in accordance with Section 02220, Paragraph 3.8.2 of the Technical Specifications. Field tests will be performed by a qualified technician. Factory and field tests will be completed in accordance with Section 02220, of the Technical Specifications, except in place density testing will be performed by Nuclear Methods, sand cone verification tests will not be performed. Granular backfill materials including gravel and sand will be compacted to non-movement.

Table 2-1 - Summary of Chemical Sampling & Analysis

D.O.#0017 - Tank Farm B - MCAS Cherry Point

Work Phase	Sample Description				Sampling			Analysis	
	Media	Technical Specification Section	Type	Description	Frequency	Estimated Total Number	Sampling Event ID	Analytes	Method
A. System Installation	Soil	02222	Waste	Excess Excavated Soil, Composite from Stockpile(s)	1 / 200cy	5	A1-A5	TPH-GRO, TPH-DRO Lead	CA GC-FID Method [1] EPA SW-846 Method 1311(TCLP)
	Water	02222	Waste	Excavation & Development Water, Composite from Holding Tank(s)	-	1	A5	Select Volatiles/Semi-Volatiles [2] Lead	EPA Method 602 & 610 Standard Method 3030C
B. Testing & Startup (including 8-hr test)	Water	11302	Process (OWS)	Oil/Water Separator Influent Water	10 / 8-hr test	10	B1	Total Oil & Grease	EPA Method 413.1
		11302	Process (OWS)	Oil/Water Separator Effluent Water	10 / 8-hr test	10	B1	Total Oil & Grease	EPA Method 413.1
		02222	Waste	Effluent Water from 8-hr Test, Composite from Holding Tank(s)	-	1	B1	Select Volatiles/Semi-Volatiles [2] Lead	EPA Method 602 & 610 Standard Method 3030C
	Process Air	-	SVE Effluent	System Effluent	3 / 8-hr test for each system	3	B1	Benzene, Tolulene, Ethylbenzene, & Xylenes	EPA Method 18
C. Full-Scale Operation	Water	02901	Process (OWS)	Oil/Water Separator Effluent Water	1 / month	6	C1-C6	Total Oil & Grease Treatment Criteria List [3]	EPA Method 413.1 EPA Method 602 & 610
			Groundwater	Monitoring Wells, per CAP	12 / quarter	24	C3, C6	Purgeable Aromatics Lead	EPA Method 602 Standard Method 3030C
	Process Air	-	SVE Effluent	System Effluent	1 / month	6	C1-C6	Benzene, Tolulene, Ethylbenzene, & Xylenes	EPA Method 18
	Sludge	---	Waste	Sludges and solids removed from the Oil/Water Separator during cleaning	-	1	C6	Target Compound List Ignitibility Corrosivity Reactivity	EPA SW-846 Method 1311(TCLP) EPA SW-846 Method 1010 EPA SW-846 Method 9045 EPA SW-846 Method 9010/9030
Quality Control Samples [4]	Water	---	Blanks	Trip Blanks (typically 1 cooler per event), per CAP	1 / Cooler	7	-	Treatment Criteria List [3] Total Oil & Grease Lead	EPA Method 602 & 610 EPA Method 413.1 Standard Method 3030C
				Field-Cleaned Equipment Blanks, per CAP	10% (minimum 1/event)	7	-	Treatment Criteria List [3] Total Oil & Grease Lead	EPA Method 602 & 610 EPA Method 413.1 Standard Method 3030C
				Duplicates, per CAP	10% (minimum 1/event)	7	-	Treatment Criteria List [3] Total Oil & Grease Lead	EPA Method 602 & 610 EPA Method 413.1 Standard Method 3030C

[1] CA GC-FID Method to be as defined by NCDEHNR per "Groundwater Section Guidelines For The Investigation and Remediation of Soils and Groundwater" (March 1993). Method is principally EPA SW-846 Method 3550/5030/8015.

[2] Select Volatiles/Semivolatiles to include Purgeable Aromatics (as identified in Method 602) & Polynuclear Aromatic Hydrocarbons (as identified in Method 610).

[3] Treatment Criteria List to include: Benzene, Ethylbenzene, Toluene, Xylenes (Total), Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene.

[4] Quality Control Samples are assumed to only be required for samples collected to verify system operations (i.e. events B1 and C1-C6)

Figure 2-1 - Equipment Decontamination Procedure

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 - Alconox 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 ug/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.

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.

3.0 WASTE STREAM MANAGEMENT PLAN

3.1 SUMMARY OF WASTE STREAMS

The proposed construction will generate four waste streams:

- Contaminated Water
- Recovered Product
- Contaminated Soil
- Construction Debris

3.2 WASTE CHARACTERIZATION

Waste characterization will follow the Sampling and Analysis Plan outlined in Section 2.0.

3.3 DISPOSAL OF WASTE STREAMS

3.3.1 Determination of Required Treatment Technology

ICHOR will utilize the Corrective Action Plan prepared by Law Engineering, Inc., and the results from field sampling and analysis as discussed in Section 2.0 to determine the required treatment technology for the waste streams generated by construction of the project. Contaminated soils and water will be identified and disposed of in accordance with Sections 02222 and 02223 of the contract document.

Contaminated waste shall be removed from MCAS Cherry Point within 45 days.

3.3.2 Disposal Facility Selection

Selection of disposal facilities will be based on results of waste characterization and in accordance with Sections 02222 and 02223 of the contract documents. All selected disposal facilities will meet appropriate Federal, State, and local regulations for the waste to be disposed of at the facility. MCAS Cherry Point is within the fire ant quarantine area. The selected disposal facility will be permitted to accept waste from the fire ant quarantine area.

3.3.3 Disposal Arrangements

ICHOR will contract with each individual disposal facility to arrange for collection, transportation and disposal of wastes. Appropriate documentation will be maintained and provided to the NTR and EAD for all disposal activities. EAD will sign all waste manifests for materials disposal.

3.4 TRANSPORTATION OF WASTESTREAMS

Waste will be transported to the disposal facilities by permitted hauling firms. Each transporter will be required to provide documentation such as current permits, inspections, and training of personnel. The transporters will be required to follow all base regulations regarding access to the site.

3.4.1 Containerization Requirements

ICHOR will containerize all waste streams in accordance with federal, state, and local or base regulations.

3.4.2 Transportation Procurement

ICHOR will contract with permitted waste hauling companies to transport waste streams to the appropriate disposal facilities.

3.4.3 Required Shipping Papers

Shipping manifests will be prepared for each load of waste material removed from the site. MCAS EAD will sign all shipping manifests.

3.5 WASTE STREAM DOCUMENTATION AND SUBMITTALS

3.5.1 Submittals

Submittals for waste stream disposal will be made in accordance with Section 02222 of the contract documents.

3.5.2 Determination of Required Documentation

Determination of the required documentation will be based on the results of the waste classification and Section 02222 of the contract documents.

4.0 ENVIRONMENTAL PROTECTION PLAN

4.1 PURPOSE

The purpose of the Environmental Protection Plan is to outline the preventive measures to be taken prior to, during, and after construction of the project which will reduce and/or eliminate risks to environmental resources. The plan also presents steps to be taken in the event an emergency occurs at the project site which threatens the environment. All work will be performed in a manner which meets the intent of federal, state, and local regulations designed to protect the environment.

4.1.1 Work Description

Work to be performed under D.O. 0017 includes the installation of product recovery and SVE wells, excavation and backfill of trenches for the pipe systems, construction of a treatment building and oil transport truck loading dock, and installation of the treatment system including the pipe system.

4.1.2 Permits

In accordance with the contract documents, the project will require the following permits and registrations to be obtained and completed prior to the start of and during on-site work:

- Excavation Permit; from Facilities Maintenance, Utilities Division
- Outage Permit; from Facilities Maintenance, Utilities Division
- Hot Works Permits as needed

In addition, a "Well Construction Record" will be completed and submitted to the State of North Carolina DEHNR, Washington Regional Office following completion of the wells.

4.1.3 Environmental Conditions Report

Prior to the start of construction, an environmental conditions survey will be performed with the ROICC or ConRep. Photographs of the preconstruction condition of the existing facilities will be taken. A written report describing the preconstruction condition of the project site, including copies of the photographs, and comments on the condition of existing paved areas to be impacted by the project will be submitted to the ROICC.

4.2 EMERGENCY AND DECONTAMINATION EQUIPMENT

ICHOR will have emergency and decontamination equipment available at Tank Farm B during construction activities. The following sections provide information on the various types of equipment to be kept at the project site.

4.2.1 Small Scale Emergency Equipment

Small scale emergency equipment to be available at the project site includes fire extinguishers, first aid kits, two-way portable radios, and flash lights. Each company vehicle and mobile construction equipment will be equipped with a fire extinguisher and first-aid kit. The office trailer will also have a fire extinguisher and first aid kit. In addition, a list of emergency response telephone numbers will be posted in the office trailer near the telephone.

4.2.2 Large Scale Emergency Equipment

ICHOR does not anticipate providing large scale emergency equipment such as fire trucks or ambulances at the project site. It is proposed to rely on MCAS Cherry Point's emergency services for such types of large scale emergency equipment.

4.2.3 Decontamination Equipment

Existing decontamination pads will be utilized as practical to decontaminate equipment and tools. In addition, a decontamination area will be set up for site personnel, and additional decontamination equipment for equipment and tools will be supplied as necessary. Decontamination equipment for personnel will include wash tubs, brushes, detergent, poly sheeting, and contaminated water collection vessels. Contaminated water collection vessels will included secondary containment or will be double walled. Decontamination equipment for equipment and tools will include a lined, bermed pad, pressure washer, sump pump and hose and collection tank. Steam washers or other decontamination equipment with open flames will not be used within the fuel farm area.

4.3 PREVENTIVE ACTIONS

ICHOR believes preventive actions are the best environmental protection measures available. Equipment maintenance and a thorough housekeeping program significantly reduce the risks to the environment during construction activities. The following sections discuss the proposed preventive actions to be employed at the project site.

4.3.1 Equipment Maintenance

All equipment to be utilized at the project site will be maintained in accordance with the manufacturer's recommendations. Where applicable, the equipment will have valid federal, state and local safety inspection documents. All equipment will be examined periodically for leaks, damage, and other defects. Operators will be instructed to report immediately any unusual operating characteristics. Any problems found during inspections or which occur during operation will be repaired immediately. In addition, a spill prevention plan will be maintained on site in the event of a leak. This plan is presented in Section 4.4.

4.3.2 Housekeeping Program

ICHOR will implement a housekeeping program at the project site. Construction debris will be collected as it is generated and placed in appropriate disposal containers. All disposal containers will have covers to prevent wind from blowing debris from the container. Workers will be trained in good housekeeping practices. Bulk delivery vehicles such as dump trucks will be required to utilize tarps to cover their loads.

4.4 Protection Of Natural Resources

Protection of natural resources will be accomplished by a number of methods. ICHOR will implement the following steps to provide for the protection of the environment during construction activities at Tank Farm B.

4.4.1 Wetland Areas

There are no wetlands within the project limits. An Erosion Control Plan (Section 4.4.4) will be implemented for this project. The control measures to be utilized will minimize impacts to downstream areas. A Spill Prevention Plan is presented in Section 4.4.10 of this document. In the event a spill occurs, steps will be taken to reduce the impact to downstream areas.

4.4.2 Oily Waste

Oily waste at the project site will be limited to the free product and contaminated groundwater encountered during construction of the recovery wells, system testing, startup and operation. In the event of a spill of oily wastes, steps outlined in Section 4.4.10, Spill Prevention Plan, will be taken.

4.4.3 Historical and Archeological Resources

It is anticipated no historical or archeological resources will be encountered during construction activities at Tank Farm B. The area has been subject to numerous excavation and fill activities over the past 60 years. Excavation depths will be limited to less than 4 feet in depth. In the event historical or archeological resources are encountered, appropriate federal, state and local agencies will be notified immediately. Work in the immediate area will be halted until the extent and nature of the resources can be determined.

4.4.4 Erosion and Sediment Control

Excavations and trenches will be completed in a manner which complies with North Carolina State erosion and sediment control regulations. Appendix B is an Erosion and Sediment Control Plan developed using the North Carolina Sediment Control Commission (NCSCC) Erosion and Sediment Control Planning and Design Manual (1993). The drawings required as part of the Erosion and Sediment Control Plan are included in the appendix. Erosion and sediment control features will include routing surface water drainage channels away from the trenches, protection of the soil staging area, and protection of cleared and excavated areas with silt fence. The site will be graded, seeded, and mulched as soon as possible after installation and construction activities to provide permanent erosion control.

4.4.5 Excess Soil Treatment and Disposal

The excavations associated with the installation of the pipe system trenches will generate excess soils. This excess soil will be segregated, stockpiled and tested for the contaminants of concern at the site in accordance with the Sampling and Analysis Plan (Section 2.0) and Section 02222 of the technical specifications. Soils, which by analysis, contain levels of contaminants in excess of the action level of 10 ppm TPH, will be sent to a state permitted soil recycling facility. Soil with TPH analysis results less than 10 ppm will be suitable for use as backfill material per North Carolina DEHNR guidelines. All excess soil removed from the site will be disposed of at a facility which complies with the appropriate regulations for disposal of soils including erosion and sediment controls.

The Environmental Compliance Division will be notified 24 hours prior to shipping of any construction generated waste, contaminated soil or water from the site. The information to be provided will include: type of waste, volume, process which generated the waste, laboratory analysis, transport manifest, destination, and verification of acceptance from the disposal facility to receive the waste. The USN will be notified of non-hazardous waste disposal. The SCHRIMP will be notified of hazardous waste disposal. MCAS Cherry Point will sign all manifests.

4.4.6 Construction Debris

Construction activities will generate debris including concrete debris, packaging materials, and cutoffs from project components. These materials will be collected on a daily basis during construction and disposed of at facilities licensed to accept construction debris.

4.4.7 Air Pollution Control

The treatment system specified and constructed under Delivery Order No. 0017 (Remediation of Subsurface Petroleum Contamination at Tank Farm B) Contract No. N62470-93-D-3033 includes an SVE extraction system to remove vapor phase volatile organic compounds from vadose zone soil. This system discharges soil vapors directly to the atmosphere. In accordance with NCDEHNR regulations, the SVE system will only require registration.

4.4.8 Water Pollution Control

The operation of the treatment system will result in the collection of free product and nuisance water. Free product recovered will be temporarily stored and transported for recycling as part of the base recycling program. Nuisance water generated as a result of free product recovery operations will be temporarily stored and transported for treatment and disposal. Upon startup of the free product recovery system, a monitoring period of 180 days will be initiated, as described in the Sampling and Analysis Plan (Section 2.0).

4.4.9 Dust Control

Construction activities will be performed in a manner which limits blowing dust and tracking of mud onto site roads. Dust control measures to be employed will include water spray, sweeping, or covering the source with plastic sheeting. Access roads will be swept or hose washed when construction activities track mud and dust producing materials onto the road surfaces. Water will only be used when it will not result in objectionable conditions such as, but not limited to ice, flooding, or pollutant discharge.

4.4.10 Spill Containment

Facilities and equipment will be provided to minimize the environmental impact of accidental fuel or oil spills during construction of the project facilities. Fuel for the construction equipment will be provided in a bermed or diked fuel storage tank of less than 500 gallon capacity, if required. Four sacks of petroleum/oil absorbent material will be provided and will be stored in the project trailer for accidental spills of fuel oil or hydraulic line failures. The temporary decontamination pad may also be used for spill containment. Spill prevention measures shall include inspection of berms, storage containers, etc. to prevent spills to the environment.

In the event of a spill, cleanup will commence immediately. All contaminated materials generated by the cleanup efforts will be packaged and disposed of in accordance with applicable federal, state, and local regulations. A Spill Report form will be completed by the Site Superintendent and shall be submitted to MCAS Cherry Point's Environmental Compliance Division through the ROICC within 24 hours of the spill occurrence.

4.4.11 Hazardous Materials

Hazardous materials brought on site for construction will be handled in a manner that minimizes the risk of personnel and property damage. A file will be kept at the job trailer with all MSDS sheets for all materials that are used on site during construction. Because MSDS sheets for a particular product are received with the product, a copy of each MSDS will be submitted to the Base EAD upon receipt. A chart will be submitted at the beginning and end of construction which summarizes material with MSDS sheets, amount, and application. Upon completion of construction, all MSDS sheets for materials that will still be used on site will be submitted to the Navy and EAD, including information on the volume of each material remaining.

4.4.12 Foreign Object Damage

Prevention of Foreign Object Damage (FOD) to aircraft is a critical concern whenever working near runways. Every effort will be made to maintain the work area clean and free from debris which could be blown or ingested by aircraft engines. Lidded trash containers will be maintained at the work zone for the collection of materials which could be blown onto runway areas.

5.0 SITE HEALTH AND SAFETY PLAN

5.1 INTRODUCTION

PDG Environmental Services, Inc. (PDGES), subcontractor to J. A. Jones Environmental Services Company (J.A. Jones), is submitting this Site Health and Safety Plan (SHSP) for the remediation of petroleum, oils, and lubricants (POL) at Marine Corps Air Station (MCAS), Cherry Point, North Carolina, (Site). This SHSP contains procedures and protocols pertaining to personnel and public health and safety issues at the site. It is through the implementation of this plan, along with *J.A. Jones Safety Program and Procedures Manual*, 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 Contract No. N62470-93-D-3033, is in compliance with the Contract Specifications, and is submitted for government approval. Government approval of proposed variation, if any, is recommended.

Certified by CIH _____, Date 30 Sept. 96
(C. Myers, CIH)

5.1.1 Health and Safety Program Maintenance

PDGES recognizes that health and safety concerns continually change at sites. Therefore, this plan will be reviewed periodically and otherwise as needed. At this time, 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 PDGES personnel and subcontractors engaged in site activities involving contact with or handling of potentially contaminated materials 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 Site Health and Safety Plan Acceptance form is included here as Figure 5-1.

5.1.3 Terminology

The following is a list of the terminology that are used throughout this SHSP:

ACGIH	-	American Conference of Governmental Industrial Hygienists
ANSI	-	American National Standards Institute
APR	-	Air Purifying Respirator
BTEX	-	Benzene, Toluene, Ethylbenzene and Total Xylenes
CFR	-	Code of Federal Regulations
CIH	-	Certified Industrial Hygienist
ConRep	-	Construction Representative
CPR	-	Cardiopulmonary Resuscitation
CRZ	-	Contamination Reduction Zone
EAD	-	Environmental Affairs Department
EZ	-	Exclusion Zone
Intrusive Activity	-	Type of construction activity where potentially contaminated materials may be encountered
J.A. Jones	-	J. A. Jones Environmental Services Company
LEL	-	Lower Explosion Limit
LEPC	-	Local Emergency Planning Committee
MSDS	-	Material Safety Data Sheet
MSHA	-	Mine Safety and Health Administration
NIOSH	-	National Institute of Occupational Safety and Health
NOSC	-	Navy On-Scene Coordinator
NTR	-	Naval Technical Representative
OSHA	-	Occupational Safety and Health Administration
OVD	-	Organic Vapor Detector
PEL	-	Permissible Exposure Limit (8-hour time weighed average)
POL	-	Petroleum, Oils, and Lubricants
ppb	-	Parts per billion
PPE	-	Personal Protective Clothing and Equipment
ppm	-	Parts per million
ROICC	-	Resident Officer in Charge of Construction
SHSO	-	Site Health and Safety Officer
SHSP	-	Site Health and Safety Plan
SZ	-	Support Zone
TPH	-	Total Petroleum Hydrocarbons
USEPA	-	U.S. Environmental Protection Agency
USCG	-	U.S. Coast Guard
USN	-	U.S. Navy
USMC	-	U.S. Marine Corps

5.1.4 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 and 1926.25)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/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, ACGIH
- Safety and Health Requirements Manual, EM-385-1-1, October 1992, US Army Corps of Engineers
- Hazardous Chemicals Desk Reference, Third Edition, Van Nostrand-Reinhold
- J.A. Jones Safety Programs and Procedures Manual, (Contract N62470-93-D-3033, POL Remedial Action)
- Final Corrective Action Plan, Tank Farm B, Marine Corps Air Station, Cherry Point, North Carolina, Law Engineering, Inc., October 13, 1993, (Contract Nos. N62470-90-D-7625/0001 and N62470-90-D-7625/0005)

5.1.5 Site History and Description

The project site is located at MCAS Cherry Point, Carteret County, North Carolina. The site is situated entirely within the confines of MCAS Cherry Point at the intersection of Roosevelt Boulevard and Slocum Road. The site is bounded to the north and east by the base runway, to the southwest by the base sewage treatment plant, and to the west by Slocum Creek. Tank Farm B consists of six 546,000 gallon underground storage tanks and associated appurtenances. Environmental investigations of this site conducted by Law Engineering, Inc. have identified a plume of free product and petroleum contaminated groundwater within and adjacent to the tank farm area.

Weather conditions in Cherry Point, North Carolina, are described as seasonal.

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 all perform essential safety roles. The following sections outline the work team's respective responsibilities and training requirements, and identifies key personnel.

5.2.1 Certified Industrial Hygienist

The CIH for the POL Remediation at the MCAS is C. Myers. He possesses the necessary experience in the health and safety aspects of remedial action projects. He will oversee the Health and Safety Program and will be available for consultation when required; however, he will not be required on-site.

5.2.2 Site Health and Safety Officer

Implementation of the SHSP is the responsibility of the SHSO. Mr. Joseph Trofe, ICHOR's Project Superintendent, will be the acting SHSO. He possesses remedial action experience and a working knowledge of the state and federal occupational safety and health regulations. Mr. Trofe has spent a considerable amount of time working on similar USN remediation projects during the past year. He has completed the required 40-hour health and safety training in accordance with 29 CFR 1910.120 and the 8-hour supervisory training. In addition, Mr. Trofe and one additional on-site ICHOR professional employee will be trained in standard first aid and CPR. All training certificates and certifications will be retained at the site during the project. Mr. Trofe possesses demonstrable experience and has received specialized training in the use and selection of PPE and is familiar with the PPE implementation program. Furthermore, he has experience in the proper use of air monitoring instrumentation and sampling procedures relevant to the activities that will be performed during this project. The SHSO will be on-site when work is in progress.

Mr. Trofe will contact the MCAS Fire Department at the commencement of work activities. He will communicate to the Fire Department the following information: type of work being conducted, potential health and safety hazards present at the site, and duration of the project. The MCAS Fire Department will be notified by dialing 911 in the event of a spill.

The Project Superintendent/SHSO will be in direct communication with the NOSC, ROICC, ConRep., J.A. Jones personnel, and other site workers. It will be his responsibility to coordinate with these individuals regarding the health and safety aspects of the POL remediation activities.

A designated alternate SHSO and Site Superintendent will be named later. He or she will possess remedial action experience and a working knowledge of the state and federal occupational safety and health regulations. He or she will have completed the required 40-hour health and safety training in accordance with 29 CFR 1910.120 and the 8-hour supervisory training. In addition, he or she will be trained in standard first aid and CPR.

5.2.3 Site Labor Forces

Site labor forces will be comprised of personnel within appropriate trade categories who possess the training and experience to work at a remedial site (40-hour OSHA training and the required refresher training).

5.3 TRAINING REQUIREMENTS

5.3.1 OSHA 1910.120 Training

ICHOR and subcontractors working on the site who may potentially be exposed to hazardous substances and/or potential health and safety hazards will have completed the 40-hour health and safety training and 8-hour refresher training as required by OSHA regulations, 29 CFR 1910.120. The SHSO will have completed the additional 8-hour supervisory training.

Visitors to the site who will not enter the exclusion zone (EZ) or contamination reduction zone (CRZ) (see Section 5.9) will not be required to complete the health and safety training; however, their activities will be monitored by an individual with health and safety training. All other visitors to the site must present current 40-hour training certificates to the SHSO prior to entering the EZ or CRZ.

ICHOR will maintain a record of training and refresher courses for all on-site ICHOR and subcontractor personnel and a record of site personnel experience under the direction of a skilled supervisor (24 hours minimum). Also, a log of visitors to the site, including name, company name/organization, date, and activities conducted will be maintained at the site. Everyone entering the site will be required to sign the log. J.A. Jones will retain these and other health and safety records after construction activities have been completed. Figure 5-2 shows the proposed standard form used for sign-in and sign-out of visitors.

5.3.2 Site-Specific Training

Site-specific training will be provided to site personnel involved in the remediation activities. The training will address potential hazards found at the site, and safety measures that must be followed on certain areas of the site where health and safety hazards may exist. Procedures regarding the buddy system, spill response, fire prevention/suppression techniques, levels of protection, recognition of potential hazards, overexposure to chemical hazards, and air monitoring will also be covered as part of the training. Further, the training will include discussion of general site conditions.

5.3.3 Daily Safety Meeting

Project personnel will be given briefings by the SHSO on a daily or as needed basis determined by the SHSO. These daily meetings will further assist site personnel in conducting their activities in a safe manner and provide workers with information on new operations, changes in work practices, or changes in environmental conditions at the work site. 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. Figure 5-3 is a summary form that will be completed to document topics discussed during each Daily Safety Meeting. The completed summary form will be provided daily to the ConRep.

5.3.4 Emergency First Aid Training

The SHSO and an additional on-site ICHOR professional employee will be trained in American Red Cross Standard First Aid, CPR, and the OSHA Bloodborne Pathogens Standard. This training has been provided 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.

5.3.5 Spill Response Training

Site personnel will be trained to respond to spills at the site. The SHSO will offer this training during the site-specific training. The training will range from awareness of spill potential to responding to spill situations. The personnel will learn how to prevent spills from occurring, how to look for and identify spills, and the location and proper use of the portable spill containment kit. Specifically, spill response training will include the following:

- 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.

The portable spill containment kit will include absorbent pads, and vermiculite. In an 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 mentioned in Section 4.0 of this Plan.

In addition, the potential exists for fuel contaminated groundwater to spill during the installation and development of the wells. If any spillage occurs because of this work, the spill will be contained immediately and reported as mentioned in Section 4.0 of this Plan. Water generated by the development of wells and during testing of pumps will be containerized for treatment by the treatment system. These containers will be regularly inspected to ensure that there is no potential for leaks.

The spill prevention training will significantly reduce the potential of any spill to occur during construction at this 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.

In the event of a spill the MCAS Cherry Point Fire Department will be notified immediately by dialing 911. MCAS Cherry Point will then make additional notifications as necessary.

5.4 MEDICAL SURVEILLANCE PROGRAM

5.4.1 Personnel Screening

In accordance with 29 CFR 1910.120(f), ICHOR is responsible for instituting a medical surveillance program for the following personnel:

- All employees who are or may be exposed to hazardous substances or health hazards at or above permissible exposure limits or, if there is no permissible limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;

- All employees who will wear a respirator for 30 days or more a year as required by 29 CFR 1910.134;

- All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

For this project, employees participating in intrusive activities (see Section 5.6) or entering the EZ (see Section 5.9) will be considered as potentially exposed to hazardous substances or health hazards.

In addition, any site worker (i.e., ICHOR employee or subcontractor employee) exhibiting symptoms relating to 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.

The ICHOR medical surveillance program is designed and will be implemented by a licensed occupational physician in accordance with 29 CFR 1910.120(f). Medical surveillance will include, at a minimum, the following procedures:

- Complete medical and work histories;
- Physical examination;
- Pulmonary function tests;
- Chest X-Ray (frequency to be determined by physician);
- EKG (frequency to be determined by physician);
- Eye examination;
- Audiometry;
- Qualitative respirator fit test;
- Urinalysis; and,
- Blood chemistry.

When personal protective equipment more stringent than Level D (see Section 5.8) is required at the site, workers that will be performing intrusive activities or entering the EZ will have completed medical surveillance, to the level described above, through their employer. The medical surveillance program described above, will categorize personnel as fit-for-duty and able to wear respiratory protection. Letters from licensed occupational physicians identifying personnel as able to wear respiratory protection will be required on-site prior to personnel using a respirator.

5.4.2 Site Medical Surveillance

The SHSO will perform on-site monitoring as described in Section 5.11 of this SHSP. The SHSO will discuss the site medical surveillance measures with the site workers during the site-specific training.

5.5 Work Activities

Listed below are the work activities to be conducted by ICHOR at the site and the anticipated order of completion. Potential health and safety hazards related to these activities are found in Sections 5.6 and 5.7 of this plan, respectively. The ICHOR work activities regarding remediation of POL are as follows:

- Setup/Construct Temporary Facilities
- Recovery And SVE Well Installation
- Piping System Installation
- Installation Of Well Oil Skimmers
- Building Construction
- Oil Transport Truck Loading Basin Construction
- Recovery and SVE Equipment Installation
- Electrical System Installation
- System Testing
- 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 the site. Presented in subsequent sections are the area in which the potential health hazard may be found, along with the form(s) in which the potential contaminant may be found. Particular attention will be paid during site-specific training to discussing the potential health hazards associated with the activities to be carried out at the site, as listed above. These hazards will be

reaffirmed in the daily safety meetings. Following are descriptions of the potential health hazards:

JP-5 (JET FUEL)

JP-5 (jet fuel) has been identified in the soil and groundwater zones at the MCAS site and may be identified by a weak petroleum odor. The fuel may be harmful via inhalation, absorption, and ingestion, and may irritate skin after prolonged exposure. The primary constituent of concern in JP-5 is naphthalene. The primary constituents of JP-5 are kerosene (Permissible Exposure Limit (PEL) of 100 ppm) and naphthalene (PEL of 10 ppm) with kerosene comprising 97% of the total and naphthalene the remaining 3%.

EXPECTED CONCENTRATIONS OF POTENTIAL HEALTH HAZARDS

To quantify the expected concentration levels of potential health hazards at the site, analytical data were obtained from the Corrective Action Plan, October 13, 1993, prepared by Law Engineering, Inc., under Contract Nos. N62470-90-D-7625/0001 and N62460-90-D-7625/0005. Soil samples were collected in the period between October, 1990, through November, 1991, and analyzed for total petroleum hydrocarbons (TPH), total organic halides (TOX), kerosene, lead, ignitability and pH. Results of the soil analyses revealed maximum TPH and kerosene concentrations of 6,300 ppm and 19,000 ppm, respectively. Groundwater samples were tested for BTEX and TPH. Groundwater sample analytical results taken from the Site Plans revealed TPH values less than the detection limits and BTEX value of 0.019 ppm. However, groundwater analytical data from the *Final Report, Comprehensive Site Assessment and Corrective Action Plan* prepared by Law Engineering showed levels of Benzene, Ethylbenzene, Toluene, and Xylenes at 1.8 ppm, 28.1 ppm, 65.0 ppm, and 151.0 ppm, respectively. A Lead concentration of 0.79 was reported. No data on the concentration of naphthalene at the site was available.

Based on the *Comprehensive Site Assessment and Corrective Action Plan* the contaminant plume does not extent to surface water and the potential for exposure exists only if the subsurface soil is disturbed below eight feet.

A Material Safety Data Sheet (MSDS) station will be located at the site trailer. A MSDS for JP-5 Jet Fuel and materials to be used during the project will be available to all site workers and will be reviewed with site workers prior to use of the material.

Following is a summary, per work activity, of potential health hazards at the MCAS Cherry Point site.

5.6.1 Setup/Construct Temporary Facilities

During this mobilization phase of the project, site personnel will not be exposed to impacted soil or groundwater. No chemicals and/or hazardous substances are expected to be used during this

phase of the project. Protective clothing above Level D (outlined in Section 5.8.1.1) and air monitoring (outlined in Section 5.8.1.2) will not be required during this phase of work.

5.6.2 Recovery and SVE Well Installation

Installation of the recovery wells and SVE wells will require augering to a depth of approximately 30 and 10 feet below ground surface, respectively. Workers may encounter petroleum fuel contaminated soil and groundwater, and free product during well installation, therefore, air monitoring will be periodically conducted in the immediate vicinity of the drilling rig and site workers, as outlined in Section 5.8.1.2, in order to identify the need for respiratory protection during this phase of the project. Visual observation as well as air monitoring will be used to identify the need for PPE in addition to respiratory protection. In addition, soil testing for TPH will be conducted at the site during drilling activities. Site-specific training will emphasize proper work practices so as to minimize contact with free product and impacted soil and groundwater during recovery well installation.

5.6.3 Piping System Installation

The potential exists for site workers to be exposed to petroleum contaminated soils during excavation of the pipe system trenches. Trench excavation will be performed by backhoe or other appropriate machinery to a maximum depth of three feet. Air monitoring and visual observation will be conducted to monitor potential worker exposure and identify the need for PPE as outlined in Sections 5.8.1.1 and 5.8.1.2. Site-specific training will emphasize proper work practices so as to minimize contact with contaminated materials.

5.6.4 Installation of Well Oil Skimmers

A well oil skimmer unit will be placed in each recovery well vault. The skimmer unit includes a belt that extends into the liquid within the well. Site workers should not be exposed to product or groundwater during installation of the skimmers, however, if the skimmer unit needs to be removed from the vault for maintenance or adjustment the potential exists for worker contact with fuel. As a precaution, air monitoring (Section 5.8.1.2) will be performed in the immediate vicinity of site workers prior to the start of this work phase and during adjustments or maintenance activities. The appropriate PPE will be provided for workers based on the results of air monitoring.

5.6.5 Equipment Building Construction

Construction of the equipment building is divided into two phases. During Phase 1, the footings and slab area will be excavated and underfloor treatment system piping installed. The potential exists for site workers to be exposed to petroleum contaminated soils during this excavation. Excavation will be performed by backhoe or other appropriate machinery to a maximum depth of

3 feet. Air monitoring will be conducted to monitor potential worker exposure as outlined in Section 5.8.1.2. Site-specific training will emphasize proper work practices so as to minimize contact with contaminated materials.

During Phase 2, The treatment building will be constructed. The work 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 site work.

5.6.6 Treatment System Installation

The treatment system installation will include setup of the system components and establishing the appropriate connections to control panels and between the equipment. The work 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 site work.

5.6.7 Oil Transport Truck Loading Basin Construction

Construction of the oil transport truck loading basin will require excavation for the footings and slab area. Excavation will be performed by backhoe or other appropriate machinery to a maximum depth of 4 feet. Prior to placement of the concrete, underfloor treatment system piping installed. The potential exists for site workers to be exposed to petroleum contaminated soils during this excavation and pipe installation. Air monitoring will be conducted to monitor potential worker exposure as outlined in Section 5.8.1.2. The appropriate PPE will be provided for workers based on the results of air monitoring and if product is visually observed. Site-specific training will emphasize proper work practices so as to minimize contact with contaminated materials.

5.6.8 Systems Testing

Testing the product recovery and SVE systems may expose site workers to free product and fuel vapors. Personnel performing these tasks will be outfitted with PPE necessary to minimize contact with product and vapors (Section 5.8.1.1). Air monitoring (Section 5.8.1.2) will be performed in the immediate vicinity of 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 if product is visually observed.

5.6.9 Site Restoration

Site restoration activities will be non-intrusive and site personnel are not expected to encounter contaminated soil or groundwater during this activity. Air monitoring will not be required during this phase of the project.

5.6.10 System Start-Up, Operation & Maintenance

Start-up, operation and maintenance of the treatment system may expose site workers to contaminated groundwater and/or free product. Personnel performing these tasks will be outfitted with PPE necessary to minimize contact with petroleum contaminated fluids (Section 5.8.1.1). Air monitoring (Section 5.8.1.2) will be performed in the immediate vicinity of 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 if product is visually observed.

5.6.11 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 remediation activities at the site. Site-specific training will include discussions on the potential safety hazards associated with site activities. The potential safety hazards will be reaffirmed in the daily safety meetings.

SPECIAL SAFETY CONCERNS

Confined Space Entry

Confined space entry is not anticipated during this project. In the event that a confined space entry is required, the procedures found in the "Confined Space Entry Program" of the *J.A. Jones Safety Programs and Procedures Manual* will be followed.

Open Trenches and Excavations

The pipe system will require excavation to approximately three feet below land surface. When working around trenches, the safety procedures found in the *J.A. Jones Safety Programs and Procedures Manual* will be followed. Daily inspections of the trench will be conducted by the SHSO and will include the following:

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

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 this project, the "Reporting Hazardous Material Spills/Incidents" procedures found in the *J.A. Jones Safety Programs and Procedures Manual* will be followed. However, during site-specific training, the SHSO will review the responsibilities that site personnel retain in the event of a spill. The SHSO will notify the MCAS Cherry Point Fire Department in the event of a small or large spill, and site workers will respond to the situation by controlling and/or containing the spill. Once the spill is under control, the procedures outlined in the "Reporting Hazardous Material Spills/Incidents" will be followed. The SHSO will submit a Spill Report to MCAS Cherry Point Hazardous Waste Program Manager in accordance with MCAS Cherry Point instructions within 24 hours of the spill occurrence. This report will detail the characteristics, extent, and response measures taken with regard to the spill. The Contractor shall reimburse MCAS Cherry Point for all costs expended due to spill response.

Hard Hat Areas

Work to be performed in areas where overhead hazards are of concern will be designated as "Hard Hat Areas." For this project all workers and site visitors will wear hard hats while on-site.

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" in the *J.A. Jones Safety Programs and Procedures 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 followed during the site-specific training prior to installation of the new system.

Following is a summary, per work activity, of potential safety hazards at the MCAS Cherry Point site. Section 5.8.2 identifies preventative measures that can be taken to complete site activities in a safe manner.

5.7.1 Setup/Construct Temporary Facilities and Site Controls

During this site activity, workers will be setting up equipment and bringing materials to the work site. 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.

5.7.2 Recovery and SVE Well Installation

Recovery and SVE well installation will require the use of a drilling rig. Workers will be exposed to potential safety hazards related to drill rig moving parts, lifting, injuries to extremities, and noise. Slip, trip and fall hazards may also be present in the vicinity of the drill rig. Although underground utilities will have been located prior to drilling activities, workers will be cognizant of the potential for unmarked utilities within the work area.

5.7.3 Piping System Installation

During the pipe system installation at the site, personnel will be working with hand operated and powered excavation 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 safe operation of equipment. These will be covered during the site-specific training. Although underground utilities will have been located prior to trenching activities, workers will be cognizant of the potential for unmarked utilities within the excavation area. Pipe installation will expose workers to slip, trip and fall hazards, and lifting hazards.

5.7.4 Installation of Well Oil Skimmers

During the installation of the skimmers, workers will be exposed to potential safety hazards related to lifting and injuries to extremities. Workers will not be in the well vaults during placement of the skimmers.

5.7.5 Equipment Building Construction

Construction of the equipment building can be divided into two phases. During Phase 1, heavy equipment will be operating in the work area to excavate footings and foundations. Workers will yield the right-of-way to the equipment, and operators will be cognizant of workers in the work zone. The use of hand signals for work activities will assist both the operator and site worker in safe operation of equipment. These will be covered during the site-specific training. Although underground utilities will have been located prior to trenching activities, workers will be cognizant of the potential for unmarked utilities within the excavation area.

During Phase 2, building construction, workers will be on ladders and scaffolding, and be required to hoist building materials into place. Workers will also be exposed to slip, trip and fall hazards.

5.7.6 Recovery and SVE Installation

During treatment system installation, workers will be on ladders and scaffolding, and be required to hoist system components into place. Workers will also be exposed to slip, trip and fall hazards.

5.7.7 Oil Transport Truck Loading Basin Construction

During construction of the oil transport truck loading basin, heavy equipment will be operating in the work area to excavate footings and foundations. Workers will yield the right-of-way to the equipment, and operators will be cognizant of workers in the work zone. The use of hand signals for work activities will assist both the operator and site worker in safe operation of equipment. These will be covered during the site-specific training. Although underground utilities will have been located prior to trenching activities, workers will be cognizant of the potential for unmarked utilities within the excavation area.

5.7.8 Treatment System Testing

During treatment system testing, 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 during the connection of system controls and sensors.

5.7.9 Site Restoration

Those areas of the site that were modified will be restored to their original form. Site workers will be exposed to potential traffic; heavy equipment; lifting; and slips, trips and fall hazards.

5.7.10 System Start-Up, Operation & Maintenance

During treatment system start-up, operation and maintenance, 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.

5.7.11 Demobilization

Demobilization activities will entail site workers dismantling those structures and/or devices used during the installation of the remediation system. 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 remediation 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 site, the work tasks to be performed at the site, and previous project experience. It is understood that site workers have learned the proper donning and doffing, maintenance, and inspection of PPE; however, ICHOR will review these topics during site-specific training.

5.8.1 Potential Health Hazard Protection

This section describes the site-specific requirements for 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 an Organic Vapor Detector (OVD) sustained for one minute in the breathing zone; and,
- Remote potential exists for physical contact or inhalation of JP-5 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 an OVD sustained for one minute in the breathing zone; and,
- Potential exists for physical contact or inhalation of JP-5 during work operations.

Level C

The following criteria determine Level C protection:

- Air monitoring readings from 10 to 100 ppm above background as detected by an OVD sustained for one minute in the breathing zone; and

- 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 that workers leave the area and that the area be ventilated. The Project Superintendent/SHSO will permit site personnel to resume work activities when the area is safe.

5.8.1.1 Personal Protection Equipment

The following would be the personal equipment for each level of protection as a minimum requirement:

Level D

- Coveralls or other appropriate clothing;
- Gloves (discretionary);
- Safety glasses;
- Leather or chemical resistant boots or shoes with steel toe and shank;
- Hard hat; and,
- Ear protection (based on noise monitoring).

Level D-Modified

- Tyvek clothing;
- Gloves;
- Full-face or half-face air-purifying canister equipped respirator (MSHA/NIOSH approved) available at work area;
- Safety glasses;
- Leather or chemical resistant boots or shoes with steel toe and shank;
- Hard hat; and,
- Ear protection (based on noise monitoring).

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);
- Inner and outer chemical-resistant gloves;
- Chemical resistant boots with steel toe and shank;
- Disposable outer boots (chemical resistant);
- Safety glasses;
- Hard hat; and,
- Ear protection (based on noise monitoring).

Levels of Protection for Work Activities

Level D attire will be worn during the majority of the site work except during excavation operations, pump placement, and where the potential exists for workers to contact groundwater or be exposed to organic vapors at the site. Level D-modified attire will be worn during these activities.

Upgrading 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, as well as require that site workers inspect their PPE for proper fit and performance. Level D-modified attire is the highest level of worker protection expected to be warranted during construction of the remediation system.

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 used at the site:

- An OVD will be used to monitor organic vapors during intrusive activities involved with POL remediation. This will be conducted in the breathing zone of the workers. The OVD will not, however, indicate specific compounds;

- An Oxygen/Lower Explosive Limit (O_2/LEL) meter will be used to monitor for oxygen content and potential for explosion in the surrounding area;

The OVD and LEL/O_2 devices will be calibrated before and after each period of use according to manufacturer's instructions and standard industrial hygiene practice. Pre-work function tests of the instrument will be performed and recorded on a daily basis when in use. Air monitoring will

be performed prior to the site work to obtain an ambient reading for the area. Subsequent readings will be taken after the various phases of construction commence.

Action Levels

Organic vapor action levels to determine required personal protection needs are provided in Section 5.8.1 of this SHSP.

Reporting Air Monitoring Results

Positive air monitoring readings detected will be recorded in the site Real Time Air Monitoring Log. The log will also include date, location of readings, weather conditions, calibration information, and the initials of person performing the monitoring. Figure 5-4 presents the standard form that will be used for recording air monitoring results. The SHSO will make the results of air monitoring events available to all site workers.

Personal Monitoring

The primary potential for workers to be exposed to organic vapors at the work site will be during the installation of wells and pipe trench excavation. The remaining site work will not involve contact with significant amounts of contaminated soil or groundwater to warrant the use of personal monitoring devices. If visible dust is generated during site activities, misting or the use of plastic sheeting will be used in the areas of concern.

Workers involved with the interceptor trench excavation may potentially be exposed to JP-5 contaminated groundwater and soil. The potential exposure routes will include inhalation, ingestion, and dermal adsorption. Exposure will be monitored by Health and Safety personnel to determine levels of inhalation and dermal protection. In addition, workers will wear personal air badges specific for petroleum hydrocarbon vapors at the beginning of excavation activities in order to monitor and document exposure to organic vapors. Analytical results will be reviewed to determine worker exposure and verify the appropriate respiratory protection.

5.8.2 Potential Safety Hazard Protection

During site activities, all workers will obey the rules and regulations developed by the USN, as well as those presented in this plan. Of special concern, with respect to site safety, are preventative measures and safe working practices that can minimize the risk of injury to site personnel. The following is a list of preventative measures that can be taken to complete site activities in a safe manner:

- Back strain can be prevented by employing proper lifting techniques when moving supplies, equipment, and tools. Site personnel will be instructed in proper lifting procedures during site-specific training.

- Slipping on wet surfaces can be minimized by using an absorbent material in a wet area, as well as wearing boots with a deep tread.

- Heavy equipment hazards can be minimized by posting signs that notify site personnel as to the existence of such equipment in the area. Additionally, those individuals operating pieces of heavy machinery should know their surroundings and the existence of workers in their respective areas.

- All live electrical lines and/or bare wires will be avoided at all times.

- Eye protection will be worn at all times.

- All personnel will be instructed regarding the location and use of fire suppression equipment.

- Debris will be collected and properly containerized, so that flying debris does not become a safety hazard.

- All personnel will be familiar with the proper use of small tools.

- In areas of potential traffic hazards, barricades or other appropriate traffic control devices will be used.

5.8.3 Hearing Conservation Plan

Working with and around the operation of heavy equipment as well as in the vicinity of aircraft, typically results in employee noise exposure equal to or in excess of an 8-hour time weighted average of 85 decibels measured on the A scale. The SHSO will monitor noise periodically with an audio dosimeter or sound level meter. Time weighted averages will be calculated automatically by the instrument or manually. Such exposure require the implementation of a hearing conservation program in compliance with 29 CFR 1910.95. The SHSO is responsible to ensure that all employees working with or near heavy equipment or aircraft are provided appropriate hearing protection and that the protection is properly worn by all individuals. The SHSO will follow the procedures outlined in the "Hearing Conservation Program" in the *J.A. Jones Safety Programs and Procedures Manual.* Site personnel will be provided with both in-ear and out-of-ear protection devices (in compliance with ANSI 512.6-1984 and ANSI 53.19-1974, respectively).

5.9 WORK ZONES AND SITE CONTROL

Drawings SK-2 and SK-3 of this Work Plan identifies the established work zones, decontamination areas (personnel and equipment), location of emergency equipment, as well as the evacuation route. Only authorized personnel will be permitted in the work zones (i.e., EZ and CRZ). Visitors potentially entering these zones 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. Overall site control will be regulated by the fuel facility.

- Exclusion Zone (EZ)

  An EZ is established to identify an area that contains potentially contaminated soil and/or groundwater. EZs can be identified by engineering controls (temporary barricades, fencing, or tape), and a sign that identifies the area as an "Exclusion Zone, Level D Modified Protection."

- 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).

- 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, workers will have toilet facilities and an area to wash their hands. Workers will be permitted to take their scheduled breaks in designated areas. There will be no hand-to-mouth activity permitted in any area other than the SZ. Communication with on-site and off-site personnel will be conducted via telephone. Should the need arise, radios will be used; however, telephones will serve as the communication device for general communication and hazard reporting. ICHOR will conform with the restrictions and procedures concerning use of radios as directed by the NTR.

5.10 DECONTAMINATION

Elements of the decontamination process and the decontamination area have been designed so as to minimize adverse environmental impacts. The procedures found in this section will be implemented under the direct supervision of the SHSO. The SHSO will monitor the decontamination practices of site personnel and evaluate effectiveness. The decontamination procedures that follow have been chosen based on the contaminants of concern, tasks to be completed, and previous experience.

5.10.1 Personnel Decontamination

Personnel in Level D, Level D-modified, and Level C attire will be required to dispose of any gloves (cloth or chemical resistant), Tyveks (if applicable), and/or boot covers, and wash their hands before leaving the site. Gloves and/or boot covers will be disposed of by the SHSO.

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 their own APR. The SHSO will discuss proper respirator decontamination techniques and advise site personnel of how to properly dispose of their used cartridges and where to store their APRs.

Temporary decontamination facilities will be constructed on-site. The location of these facilities will be coordinated by the SHSO and USN personnel at the site, with advisement from EAD and fuel department personnel. ICHOR will maintain the decontamination facilities. The following decontamination steps at the respective levels are required:

<u>Level C Decontamination Steps</u>

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 Thoroughly Wash Hands and Face

<u>Level D (Modified) Decontamination Steps</u>

Step 1 Outer Glove Wash
Step 2 Outer Glove Rinse
Step 3 Tape Removal
Step 4 Outer Glove Removal
Step 5* Inner Glove Rinse
Step 6 Tyvek Removal
Step 7 Safety Boot Wash

Step 8 Safety Boot Rinse
Step 9* Inner Glove Removal
Step 10 Remove Respirator if Worn
Step 11 Thoroughly Wash Hands and Face

Level D Decontamination Steps

Step 1 Remove Outer Garments (i.e., coveralls)
Step 2 Remove Outer Gloves
Step 3* Remove Inner Gloves
Step 4 Thoroughly Wash Hands and Face

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

Waste water generated during personnel decontamination will be collected and stored on-site in drums or other appropriate containers with contents identified, dated, and marked "Pending Analysis." ICHOR personnel will coordinate a storage location with on-site USN representatives.

5.10.2 Equipment Decontamination

Equipment used in excavation and other site activities will be decontaminated after tasks are completed and prior to leaving the site. Only portions of the equipment that come in contact with potentially contaminated material will be decontaminated.

Monitoring equipment will be decontaminated with a phosphate-free soap and water.

In the event of inclement weather where precipitation is of concern, trucks and equipment wheels will be cleaned before being permitted to travel on roads leaving the work area. The location of the equipment decontamination area will be coordinated by the SHSO and USN personnel; however, Drawing *C-1* illustrates the anticipated location of the equipment decontamination area.

Wastewater generated during equipment decontamination will be collected and stored on-site in drums or other appropriate containers with contents identified, dated, and marked "Pending Analysis."

5.10.3 Wastewater Disposal

Upon completion of all necessary personnel and equipment decontamination at the site, a composite sample of the fluids will be collected. If the analytical results show constituent levels that do not exceed the Base Industrial Wastewater Treatment Plant (IWTP), the wastewater will be processed at the plant. Otherwise, the decontamination fluids will be disposed of off site at a

licensed treatment facility. If decontamination fluids must be disposed of off site, waste profile and manifest forms will be signed by the EAD prior to shipment and a copy provided to the MCAS Cherry Point Environmental Compliance Division.

5.11 CONTINGENCY PLAN

The following contingency plan has been developed in the event that extraordinary situations arise during site 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 5-5 lists the Emergency Telephone Numbers that will be posted at the site. A map to the hospital will be posted at the site, and will be shown as Figure 5-6.

5.11.1 General Response Conditions

Emergencies at the site must addressed in a manner that minimizes the health and safety risk to both site personnel and the public. The following sections outline potential incidents.

5.11.1.1 First Aid

First aid will be administered by the closest, certified individual to the accident/incident. 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.

Bloodborne Pathogens Program

In regard to first aid procedures, ICHOR will follow the "Bloodborne Pathogens Exposure Control Program" (in accordance with 29 CFR 1910.1030), found in the *J.A. Jones Safety Programs and Procedures Manual.* A copy of the program will be retained at the site, and will be reviewed during site-specific training.

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 and arranging for their assistance during this time.

The SHSO is responsible for completing an Injury Report. Figure 5-7 details the standard form that will be used in this situation. Copies of all injury reports will be submitted to the Contracting Officer weekly.

5.11.1.3 Response Requirements

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. One additional site worker will be certified in Adult CPR and First Aid.

5.11.2 Responsibilities

The SHSO will be responsible for directing responsive 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 list of the telephone numbers of response agencies to be contacted will be developed prior to mobilization on-site. The Fire Department 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 remediation activities begin, the following emergency equipment will be stored at the site trailer and tested to verify working order:

- First aid kit (16-unit);
- Air horn;
- Emergency eyewash station (Compliant with ANSI Standard Z358.1-1990);

- 20 pound fire extinguisher (ABC-type);
- Additional Tyvek and other PPE, safety glasses, hard hats, hearing protection, respirators;
- Water for washing hands and face; and,
- Emergency Response Equipment including oil sorbent pads and 4 sacks of petroleum/oil absorbent material.

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 activities.

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 handled 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 an unnecessary risk.

5.11.5.1 Workers Injury

The remediation activities to be performed have the potential to cause worker injury, many of which may 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 illnesses to the SHSO.

If a worker is physically injured, 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, they 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 those medical personnel. Prior to any work being done on this site, all potential emergency responders will be contacted and informed of the potential hazards of work and expected level of protection the workers will be in.

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 large quantities of water.

- Inhalation - If a person inhales large amounts of organic vapor, move to fresh air immediately. If breathing has ceased, perform CPR immediately. Always protect the individual from extreme temperatures and keep them as calm as possible. Medical attention should be sought immediately.

- 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 possible 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.

Cold Stress

Cold related illnesses are caused by the inability to generate metabolic heat in conjunction with excessive environmental cold. Cold Stress can take many forms including trench foot, frostnip, and hypothermia. Symptoms of cold stress include shivering, slurred speech, tingling and itching of extremities, dark bluish color, burning sensation followed by numbness, lowering of core body temperature, muscular weakness, uncoordination, and dulled mental ability.
Cold stress can be identified by uncontrollable shivering, weak pulse, slurred speech, and cold skin.

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 to 40°F) with moderate winds (1 to 4 mph). When temperatures fall within the aforementioned range, the SHSO will implement the proper controls found in the "Controlling Heat/Cold Stress" section of the *J.A. Jones Safety Programs and Procedures Manual* which will be readily available on the site. This will also include reevaluating the effectiveness and limitations of PPE selected for site activities.

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

- Visual monitoring of and verbal communication with workers;
- Dry, loose clothing over extremities;
- Proper diet, acclimation, and rest;
- Establishment of work-rest regimen that will provide adequate rest periods of warming; and,
- Taking breaks in a warm area.

Workers sustaining a cold stress related injury such as hypothermia or frostbite will be taken the hospital for treatment immediately.

Heat Stress

Heat related illnesses are caused by the body's inability to dissipate metabolic heat in conjunction with excessive environmental heat. Heat Stress can take many forms ranging from heat rash and heat cramps to heat exhaustion and heat stroke. Symptoms of heat stress include skin rash, reduced sweating, weak pulse, shallow breathing, pale clammy skin, dizziness, fatigue, confusion, increased body temperature, and nausea.

The likelihood of heat stress can increase with increased levels of PPE. Tyvek and other synthetic coveralls can increase sweating and decrease heat loss and ventilation. The SHSO will consider the level of PPE when scheduling breaks and will be in direct communication with the work force. Some of the considerations will be:

- Humidity;
- Temperatures; and,
- Air movement.

One or more of the following control measures will be employed to help control heat stress:

- Visual monitoring of personnel;

- 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 a 0.1 percent salt solution or commercial thirst quencher and fresh water;

- Establishment of a work-rest regiment that will provide adequate rest periods for cooling down;

- Breaks taken in a cool rest area;

- Employees not being assigned other tasks during rest period; and,

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

Workers sustaining a heat stress related injury such as heat stroke will be taken the hospital for treatment immediately.

Refuges for Emergency Situation(s)

The SHSO will coordinate with USN personnel in order to establish an emergency refuge for site personnel. This refuge will shield workers from inclement weather and/or other hazards that may arise in an emergency situation. Heat/cold stress work breaks may be taken in this area. The location of the refuge areas will be determined during the initial setup at the work sites.

5.11.5.3 Fires

Personnel in each work crew will be knowledgeable in fire-suppression techniques. The Site-Specific Training will cover:

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

Small Fires

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

- Notify the MCAS Fire Department;
- 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; and,
- 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:

- Evacuate all personnel from the area of the fire, preferably to an upwind location;
- Order the appropriate level of protective clothing; and,
- Notify the MCAS Fire Department and other emergency response agencies.

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. The collection point (area where workers gather before evacuating) and evacuation route are illustrated in Drawing *SK-1 and SK-2*. This drawing will be posted for all site personnel to see. Moreover, the evacuation procedures will be reviewed during site-specific training.

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 dangers. The SHSO will also be responsible for ordering the commencement of work once the danger has passed.

Figure 5-1

SITE HEALTH AND SAFETY PLAN ACCEPTANCE FORM

REMEDIATION OF SUBSURFACE PETROLEUM CONTAMINATION
MARINE CORPS AIR STATION, CHERRY POINT, NORTH CAROLINA
CONTRACT NO. N62470-93-D-3033
DELIVERY ORDER #0017

We, the undersigned, hereby attest that we have reviewed the Site Health and Safety Plan and will follow the procedures, protocols, and practices it sets forth.

Name	Organization	Signature	Date

Figure 5-2

SIGN-IN LOG

REMEDIATION OF SUBSURFACE PETROLEUM CONTAMINATION
MARINE CORPS AIR STATION, CHERRY POINT, NORTH CAROLINA
CONTRACT NO. N62470-93-D-3033
DELIVERY ORDER #0017

DATE: _____

VISITOR NAME	COMPANY NAME	TIME IN	TIME OUT	TO SEE	PURPOSE OF VISIT

(REV April 30, 1996)

Figure 5-3

Remediation of Subsurface Petroleum Contamination
Marine Corps Air Station, Cherry Point, North Carolina
Contract No. N62470-93-D-3033
Delivery Order #0017

Daily Safety Meeting

Date: _____ Time: _____ HSO: _____

Safety Topics Presented

Issue	*Today's Work Areas*			
Chemicals of Concern				
Physical Hazards of Concern				
Special Concerns				

Attendees (Please Print)

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

(rev 3-6-95)

Figure 5-4

Remediation of Subsurface Petroleum Contamination
Marine Corps Air Station, Cherry Point, North Carolina
Contract No. N62470-93-D-3033
Delivery Order #0017

Air Monitoring Log

Project Name: _____ SHSO: _____

Date	Init.	Instrument	Location	Suspected Compound	Conc.	Unit	Comments

(REV 4/30/96)

Figure 5-5

Remediation of Subsurface Petroleum Contamination
Marine Corps Air Station, Cherry Point, North Carolina
Contract No. N62470-93-D-3033
Delivery Order #0017

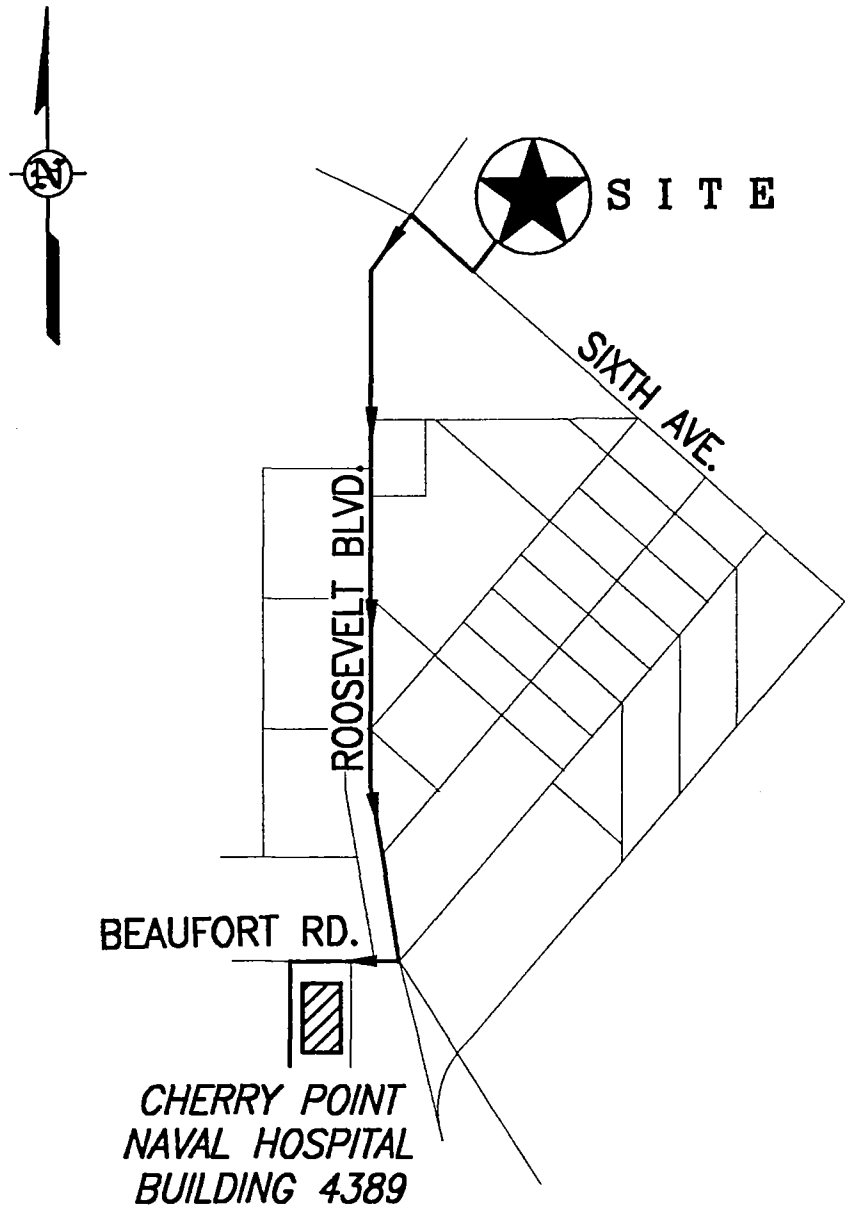
Emergency Telephone Numbers

US Navy / On-Site Emergency Telephone Numbers

NOSC	To Be Posted
Fire	466-3333
Security	466-3615
Cheery Point Hospital	466-0266
ROICC-Ms. Karen Boyd	466-4762
COTR- Mr. Greg Hedley	(757) 322-8423

Off-Site Emergency Telephone Numbers

SHSO (Off Site)	To Be Posted
Rescue Squad	911
Fire	911
Police	911
Craven Regional Med. Center	633-8111
Poison Control-Carolina Med.	(800) 848-6946
ChemTrec/Spill Response	(800) 424-9300
National Response Center	(800) 424-8802



NOT TO SCALE

DIRECTIONS TO CHERRY POINT NAVAL HOSPITAL

Turn RIGHT on to SIXTH AVE. (NORTHWEST).
Follow SIXTH AVE. approximately 0.5 MILE to ROOSEVELT BLVD.
Turn LEFT on to ROOSEVELT BVLD.
Follow ROOSEVELT BLVD. approximately 1.5 MILES to BEAUFORT ROAD.
Turn RIGHT on to BEAUFORT ROAD
Follow BEAUFORT ROAD approx. 100 YARDS.
Turn LEFT into HOSPITAL entrance road.

REMEDIATION OF SUBSURFACE PETROLEUM CONTAMINATION AT TANK FARM B		
ROUTE TO CHERRY POINT NAVAL HOSPITAL		
MARINE CORPS AIR STATION CHERRY POINT, NORTH CAROLINA		
CHECKED BY: SAH 6/20/97 APPROVED BY: WJE 6/20/97	DWG. NO. 45817A2	FIGURE NO. 5-6
ICHOR Services, Inc.		

SNO C:\R13\DWG\D817\45817A2 :JUN20,1997 10:00AM

Figure 5-7

EMPLOYEE INJURY REPORT

This is an official document to be initiated by the employees' supervisor. Please answer all questions completely. This report must be forwarded to the employees regional Health and Safety office within 24 hours of the injury.

Injured Employee Information

Personal

First Name: _____ Middle Initial: _____ Last Name: _____

Sex: _____ Social Security No. _____ Date of Birth _____ Age _____

Street Address _____

City _____ State _____ Zip _____ County _____

Phone No. (Include Area Code) _____

Wage and Occupation

Wages per hour _____, day _____, per week _____ Occupation Title _____

Injury or Illness Information

Date of Injury: _____ Time: _____ Time Reported: _____ To Whom? _____

Date you first knew of injury: _____

What was the employee doing when injured? _____

_____

_____

Object or substance, machine or tool that directly injured employee? _____

_____

_____

Nature of injury: (laceration, contusion, sprain, fracture etc.)_____

Exact body part injured: (left or right, index finger, elbow, knee etc.)_____

Was mechanical defect involved? _____ If so, explain: _____

_____

Was unsafe act involved? _____ If so, explain: _____

_____

Was employee unable to work on any day after the injury? _____

Has employee returned to work? _____ If so, when? _____ Did employee request medical care? _____

Did you provide it? _____

Hospital or Doctor Information

Name of Hospital or Doctor: _____

Street Address _____

City _____ State _____ Zip _____ County _____

Phone No. (Include Area Code) _____

Accident Location Information

Project No.: _____

Was accident on employers premises? _____ Where there any witnesses?_____

Owners Name: _____

Street Address _____

City _____ State _____ Zip _____ County _____

Phone No. (Include Area Code) _____

Facility Name: _____

Street Address _____

City _____ State _____ Zip _____ County _____

Phone No. (Include Area Code) _____

_____ _____

Supervisor Signature Date

6.0 QUALITY CONTROL PLAN

The requirements of the *Program Quality Control Plan* written by J.A. Jones will be followed for this project. A copy of the *Program Quality Control Plan* will be on file at the site office trailer.

6.1 INSPECTIONS AND VERIFICATIONS

Quality control inspections will be performed by the SQA, the PQC Manager, and/or their designated inspectors. The types of inspections to be performed include preparatory, initial, follow-up, and completion inspections. The details of each of these types of inspections are included in Section 4.2 of the *J.A. Jones Program Quality Control Plan* and are as follows:

Preparatory Phase

Prior to beginning a particular definable feature of work, drawings, specification requirements, submittal status, material requirements and onsite condition of materials, work methods, and schedule will be reviewed by the SQA. The ROICC and EAD will be notified in writing at least two business days in advance of a preparatory inspection, and this notification will be made part of the written record.

Initial Phase

This phase of inspection will document the completeness and acceptability of the particular definable feature of work after a representative portion of the work has been completed. The SQA will complete this phase of inspection with input from the PQC Manager where necessary.

The following information will be documented on the daily Contractor Quality Control Report (Figure 6-1) during this phase:

- Preliminary work has been done correctly;
- Samples have been taken properly;
- Workmanship is satisfactory;
- Test results are acceptable; and,
- Work is in compliance with the drawings, specifications, and approved submittals.

Deficiency Reports (Figure 6-2) by J.A. Jones and the Rework List (Figure 6-3) by ICHOR will be completed as necessary. The ROICC and EAD will be notified in writing at least two business days in advance of an initial inspection, and this notification will be made part of the written record.

Follow-up Phase

This phase of inspection involves daily surveillance of the definable feature of work to verify conformance to the drawings and specifications. The inspection information will be documented on the daily Contractor Quality Control Report. The SQA as well as other QC personnel will be involved in the follow-up inspections as necessary. Any noncompliance will be documented on the Rework Items List.

Completion

At the completion of a definable feature of work , the SQA will conduct a completion inspection to make sure all work and rework items are complete and in conformance with the drawings and specifications. The results of this inspection will be documented on the daily Contractor Quality Control Report. The ROICC and EAD will be notified in writing at least two business days in advance of an initial inspection, and this notification will be made part of the written record.

Following are presented the specific reference information that will form the basis of the three levels of quality control inspections performed on the definable features of work for D.O. No. 0017.

6.1.1 Recovery and SVE Well Installation

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements
  - USN C-1 Site Plan, Existing Conditions
  - USN C-2 Site Plan, Existing Conditions
  - USN C-3 Utility Plan
  - USN C-4 Utility Plan
  - USN C-9 Details
  - USN B-1 Boring Logs
  - ICHOR SK-1 Site Plan
  - ICHOR SK-2 Temporary Facilities, Sheet 1 of 2
  - ICHOR SK-3 Temporary Facilities, Sheet 2 of 2
  - ICHOR SK-4 Erosion and Sediment Control Plan, Sheet 1 of 2
  - ICHOR SK-5 Erosion and Sediment Control Plan, Sheet 2 of 2
  - ICHOR SK-6 Erosion and Sediment Control Details

- Specification Requirements
  - 01010 General Paragraphs
  - 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
  - 02223 Transportation and Disposal of Contaminated Material

- 02900 Free Product Recovery System
- 02901 SVE System

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.2 Piping System Installation

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements;
  - USN C-1 Site Plan, Existing Conditions
  - USN C-2 Site Plan, Existing Conditions
  - USN C-3 Utility Plan
  - USN C-4 Utility Plan
  - USN C-9 Details
  - USN E-1 Electrical Abbreviations, Legends and Notes
  - USN E-2 Electrical Site Plan
  - USN I-1 Control Logic
  - USN B-1 Boring Logs
  - ICHOR SK-1 Site Plan
  - ICHOR SK-2 Temporary Facilities, Sheet 1 of 2
  - ICHOR SK-3 Temporary Facilities, Sheet 2 of 2
  - ICHOR SK-4 Erosion and Sediment Control Plan, Sheet 1 of 2
  - ICHOR SK-5 Erosion and Sediment Control Plan, Sheet 2 of 2
  - ICHOR SK-6 Erosion and Sediment Control Details
  - ICHOR C-1 Utility Building and Installation Plan
  - ICHOR E-1 Electrical Site Plan

- Specification Requirements;
  - 01010 General Paragraphs
  - 01561 Erosion And Sediment Control
  - 02220 General Excavation, Filling, And Backfilling
  - 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
  - 02223 Transportation and Disposal of Contaminated Material
  - 02900 Free Product Recovery System
  - 02901 Soil Vapor Extraction System

- 03302 Cast-In-Place Concrete
- 05500 Metal Fabrications
- 15011 Mechanical General Requirements
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.3 Installation Of Well Oil Skimmers

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements;
  - USN C-1 Site Plan, Existing Conditions
  - USN C-2 Site Plan, Existing Conditions
  - USN C-3 Utility Plan
  - USN C-4 Utility Plan
  - USN C-9 Details
  - USN B-1 Boring Logs
  - ICHOR C-1 Utility Building and Installation Plan

- Specification Requirements;
  - 01010 General Paragraphs
  - 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
  - 02223 Transportation and Disposal of Contaminated Material
  - 02900 Free Product Recovery System
  - 15011 Mechanical General Requirements

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.4 Treatment Building Construction

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements;
  - USN C-1 Site Plan, Existing Conditions
  - USN C-3 Utility Plan
  - USN A-1 Equipment Building Elevations
  - USN A-2 Equipment Building Details
  - USN S-2 Equipment Building Foundation Plan And Details
  - USN S-3 Equipment Building Drainage Plan And Details
  - USN M-1 Heating And Ventilation Equipment Layout
  - USN M-2 Heating And Ventilation Schedules, Details And Abbreviations
  - USN E-1 Electrical Abbreviations, Legend And Notes
  - USN E-2 Electrical Site Plan
  - USN E-3 Electrical Equipment Power Plan
  - USN E-4 Electrical Lighting Plan
  - USN E-5 Electrical Details And Schedules
  - USN E-6 Electrical Panel Schedules
  - USN E-7 Electrical Fixture Details
  - USN I-1 Control Logic
  - ICHOR SK-1 Site Plan
  - ICHOR SK-2 Temporary Facilities, Sheet 1 of 2
  - ICHOR SK-3 Temporary Facilities, Sheet 2 of 2
  - ICHOR SK-4 Erosion and Sediment Control Plan, Sheet 1 of 2
  - ICHOR SK-5 Erosion and Sediment Control Plan, Sheet 2 of 2
  - ICHOR SK-6 Erosion and Sediment Control Details
  - ICHOR C-1 Utility Building and Installation Plan
  - ICHOR E-1 Electrical Site Plan
  - ICHOR S-1 Building Elevations
  - ICHOR S-2 Building Foundation - Plan
  - ICHOR S-3 Building Foundation - Details
  - ICHOR S-4 Building - Plan and Details
  - ICHOR S-5 Roof Framing - Plan and Details
  - ICHOR M-1 Ventilation Equipment - Layout and Details
  - ICHOR E-1 Electrical Site Plan
  - ICHOR E-2 Electrical Equipment - Power Plan
  - ICHOR E-3 Electrical Equipment - Lighting Plan
  - ICHOR E-4 Electrical Equipment - Details & Schedules

- Specification Requirements:

01010	General Paragraphs
01561	Erosion & Sediment Control
02220	General Excavation, Filling, And Backfilling
02222	Excavation, Removal, And Treatment Of Petroleum Contaminated Material
02223	Transportation and Disposal of Contaminated Material
03302	Cast-In-Place Concrete
04200	Unit Masonry
05500	Metal Fabrications
06100	Rough Carpentry
06200	Finish Carpentry
07112	Bituminous Dampproofing
07220	Roof Insulation
07311	Asphalt Shingles
07600	Flashing And Sheet Metal
07920	Sealants
08110	Steel Doors And Frames
08331	Rolling Service Doors
08710	Finish Hardware
10201	Metal Louvers
15011	Mechanical General Requirements
15501	Heating And Ventilating System
16011	Electrical General Requirements
16301	Underground Electrical Work
16402	Interior Wiring Systems
16510	Interior Lighting
16670	Lightning Protection System

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.5 Recovery and SVE Equipment Installation

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- USN C-1 Site Plan, Existing Conditions
- USN C-3 Utility Plan
- *USN C-6 Groundwater Treatment Schematic Flow Diagram*
- *USN C-7 Equipment Layout*
- *USN C-8 Equipment Elevations*
- USN S-1 Truck Loading Containment Basin Foundation Plan And Details
- USN S-2 Equipment Building Foundation Plan And Details
- USN S-3 Equipment Building Drainage Plan And Details
- USN M-1 Heating And Ventilation Equipment Layout
- USN M-2 Heating And Ventilation Schedules, Details And Abbreviations
- USN E-1 Electrical Abbreviations, Legend And Notes
- USN E-2 Electrical Site Plan
- USN E-3 Electrical Equipment Power Plan
- USN E-4 Electrical Lighting Plan
- USN E-5 Electrical Details And Schedules
- USN E-6 Electrical Panel Schedules
- USN E-7 Electrical Fixture Details
- USN I-1 Control Logic
- *ICHOR C-2 Equipment Layout*
- *ICHOR C-3 Civil Details*
- ICHOR E-1 Electrical Site Plan
- ICHOR S-1 Building - Elevations
- ICHOR S-2 Building Foundation - Plan
- ICHOR S-3 Building Foundation - Details
- ICHOR S-4 Building - Plan and Details
- ICHOR M-1 HVAC Layout
- ICHOR E-1 Electrical Site Plan
- ICHOR E-2 Electrical Equipment - Power Plan
- ICHOR E-3 Electrical Equipment - Lighting Plan
- ICHOR E-4 Electrical Equipment - Details & Schedules
- ICHOR E-5 Electrical Lighting Fixture (Non-Explosive) Details

- Specification Requirements;
  - 01010 General Paragraphs
  - 02220 General Excavation, Filling, And Backfilling
  - 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
  - 02223 Transportation and Disposal of Contaminated Material
  - 03302 Cast-In-Place Concrete

- 10201 Metal Louvers
- 11302 Packed, Gravity Oil-Water Separator
- 11303 Pumps: Water, Centrifugal
- 13205 Aboveground Storage Tank
- 13321 Flow Measuring Equipment
- 15011 Mechanical General Requirements
- 15501 Heating And Ventilating System
- 16011 Electrical General Requirements
- 16301 Underground Electrical Work
- 16402 Interior Wiring Systems
- 16510 Interior Lighting

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.6 Oil Transport Truck Loading Basin Construction

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements;
  - USN C-1 Site Plan, Existing Conditions
  - USN C-3 Utility Plan
  - USN C-7 Equipment Layout
  - USN C-8 Equipment Elevations
  - USN S-1 Truck Loading Containment Basin Foundation Plan And Details
  - USN E-1 Electrical Abbreviations, Legend And Notes
  - USN E-2 Electrical Site Plan
  - USN E-3 Electrical Equipment Power Plan
  - USN E-4 Electrical Lighting Plan
  - USN E-5 Electrical Details And Schedules
  - USN E-6 Electrical Panel Schedules
  - USN E-7 Electrical Fixture Details
  - USN I-1 Control Logic
  - ICHOR SK-1 Site Plan
  - ICHOR SK-2 Temporary Facilities, Sheet 1 of 2
  - ICHOR SK-3 Temporary Facilities, Sheet 2 of 2
  - ICHOR SK-4 Erosion and Sediment Control Plan, Sheet 1 of 2

- ICHOR SK-5 Erosion and Sediment Control Plan, Sheet 2 of 2
- ICHOR SK-6 Erosion and Sediment Control Details
- ICHOR S-1 Building - Elevations
- ICHOR S-2 Building Foundation - Plan
- ICHOR S-3 Building Foundation - Details
- ICHOR S-4 Building - Plan and Details
- ICHOR C-1 Utility Plan
- ICHOR C-2 Equipment Layout
- ICHOR C-3 Equipment Elevations
- ICHOR E-1 Electrical Site Plan
- ICHOR E-2 Electrical Equipment - Power Plan
- ICHOR E-3 Electrical Equipment - Lighting Plan
- ICHOR E-4 Electrical Equipment - Details & Schedules
- ICHOR M-1 Ventilation Equipment - Layout and Details

- Specification Requirements;
  - 01010 General Paragraphs
  - 01561 Erosion & Sediment Control
  - 02220 General Excavation, Filling, And Backfilling
  - 02222 Excavation, Removal, And Treatment Of Petroleum Contaminated Material
  - 02223 Transportation and Disposal of Contaminated Material
  - 03302 Cast-In-Place Concrete
  - 05500 Metal Fabrications
  - 07920 Joint Sealants
  - 15011 Mechanical General Requirements
  - 16011 Electrical General Requirements
  - 16301 Underground Electrical Work

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly;

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.7 System Testing

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Specification Requirements;
  - 01010 General Paragraphs
  - 02900 Free product Recovery System
  - 02901 SVE System
  - 11302 Packed, Gravity Oil-Water Separator
  - 11303 Pumps: Water, Centrifugal
  - 13205 Aboveground Storage Tank
  - 13321 Flow Measuring Equipment
  - 15011 Mechanical General Requirements
  - 16011 Electrical General Requirements
  - 16301 Underground Electrical Work

- Factory/field test requirements; and,

- Work methods and schedule.

6.1.8 Site Restoration

The following will be reviewed with appropriate information recorded on the daily Contractor Quality Control Report:

- Drawing Requirements;
  - ICHOR SK-2 Temporary Facilities, Sheet 1 of 2
  - ICHOR SK-3 Temporary Facilities, Sheet 2 of 2
  - ICHOR SK-4 Erosion and Sediment Control Plan, Sheet 1 of 2
  - ICHOR SK-5 Erosion and Sediment Control Plan, Sheet 2 of 2
  - ICHOR SK-6 Erosion and Sediemnt Control Details

- Specification Requirements;
  - 01010 General Paragraphs
  - 01561 Erosion And Sediment Control
  - 02220 General Excavation, Filling, and Backfilling

- Approval of applicable submittals (see Figure 6-4; Submittal Register);

- Materials delivered comply with approved submittals and are stored properly.

- Factory/field test requirements; and,

- Work Methods and Schedule.

6.1.9 Laboratory Analysis

Confirmatory samples of potentially contaminated soil, decontamination water, well development water, and nuisance water will be collected under the direction of a qualified scientist or engineer.

Sample shipping and chain of custody records will be kept on file at the ICHOR field office. All laboratory analysis will be performed by facilities in the Navy Program as defined in the *J.A. Jones Program Quality Control Plan.*

The laboratories approved for use are as follows:

- Inchape Testing Services; Richardson, TX
- RECRA Environmental Inc.; Amherst, NY
- CompuChem Environmental Corp.; Research Triangle Park, NC
- Precision Analytical; Milwaukee, WI
- Quanterra; Tampa, FL

Section 2.0 of this Work Plan addresses sampling and analysis.

6.1.10 Backfill and Fill Material Testing

One composite sample of backfill and fill material will be tested in accordance ASTM D 698 for moisture-density relationship, as applicable.

6.1.11 Select Material Testing

One sample of select material will be tested in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 698 for moisture-density relations, as applicable.

6.1.12 Density Tests

All in-place density tests will be done in accordance with ASTM D 2922 and ASTM D 3017. Testing will be conducted at randomly selected locations for the pipe trench backfill at a frequency specified by the USN.

6.1.13 Concrete

Samples of fresh concrete will be collected according to ASTM C 172. Testing will consist of slump tests in accordance with ASTM C 143 and air content according to ASTM C 231. Tests will be conducted at the start of concrete placement and for every batch (minimum) or every 10 cubic yards (maximum). Each test specimen will be in accordance with ASTM C 31.

6.2 DOCUMENTATION

6.2.1 SQA Responsibilities

The organization chart for this project is presented in Figure 6-5 of this document. The diagram depicts key project management personnel, their responsibilities, and chain of command.

Attached to this section of the Work Plan is a copy of a letter from the Program Quality Control (PQC) Manager appointing Mr. Joseph Trofe as the ICHOR Site Quality Administrator (SQA) for Delivery Order No. 0017 (D.O. No. 0017). As the J.A. Jones Quality Control person assigned to D.O. No. 0017, Mr. Trofe has the authority to perform and accept/reject those Quality Control (QC) activities required by D.O. No. 0017.

The SQA is responsible for:

- Attending the coordination and mutual understanding meeting with the Resident Officer in Charge of Construction (ROICC) and Environmental Affairs Department (EAD) after submittal of the QC Plan and prior to the start of construction, and preparing minutes of that meeting to be signed by both ICHOR and the ROICC;

- Conducting QC meetings at the site once every two weeks or as appropriate. The SQA shall prepare minutes and provide a copy to the ROICC and EAD within two days. The SQA will notify the ROICC and EAD at least 48 hours in advance of each meeting. Items to be covered at the meeting include:

  - Review of minutes of previous meeting;
  - Review of the schedule and status of work;
  - Review of the status of submittals;
  - Review next two weeks of work and documentation required;

- Schedule three phases of control and testing for next two weeks;
- Resolve QC and production problems; and,

Address items that may require revising QC Plan.

- Maintaining current and complete records of onsite and off-site QC operations and activities including the following:

  - *Updated Submittal Register* received from J.A. Jones;
  - *Updated Project Schedule*;
  - *Daily Contractor Production Reports*. Report form is included in Figure 6-6;
  - *Daily Contractor Quality Control Report* that identifies the definable features of work and the appropriate control phase (see Section 6.1).
  - *Testing Plan and Log*. As tests are performed, record pertinent information on the Testing Plan and Log. Forward updated Testing Plan and Log to the ROICC at the end of each month. The Log for D.O. No. 0017 is included in Figure 6-7;
  - *Rework Items List*. Forward updated Rework Items List to the ROICC and EAD at the end of each month.
  - *As-Built Records* of the project specifications and drawings; and,
  - *Change Log*. The updated Change Log shall be submitted weekly to the Program Management Office and at the end of each month to the ROICC and EAD. At the completion of work on D.O. No. 0017, the SQA will prepare a certificate attesting to the accuracy of the as-built records. The QC certificate and as-built records will be submitted to the ROICC. A Change Log form is included in Figure 6-8.

- Performing the three phases of control to determine that all work performed complies with the D.O. No. 0017 requirements;

- Participation in the development, review and approval (as appropriate) of contractually required submittals;

- Identifying unsatisfactory work and having it corrected; and,

- Overviewing the performance of any testing laboratory or subcontractor activities required for D.O. No. 0017.

The ICHOR SQA will conduct inspections on a continuous basis of the system construction and installation for compliance in accordance with specifications and drawings.

In addition to the SQA, ICHOR professional personnel will be onsite to support the QC effort as required. The ICHOR support person will possess the necessary training and experience in the particular area of construction to assist in onsite QC. J.A. Jones PQC Manager will conduct quality inspections periodically during D.O. No. 0017 construction.

6.2.2 Notices To NTR

All notifications required by the contract documents will be directed to the NTR and, where applicable, EAD.

6.2.3 Station Permits

In accordance with the contract documents, the project will require the following permits to be obtained prior to the start of onsite work:

- Hot Works Permit; from Facilities Maintenance, Utilities Division
- Excavation Permit; from Facilities Maintenance, Utilities Division
- Outage Permit; from Facilities Maintenance, Utilities Division

6.2.4 Daily Reports, Production

ICHOR personnel will prepare a Daily Contractor Production Report. An example of the form is included in this Work Plan, Appendix A.

6.2.5 Daily Reports, QC

ICHOR' SQA Manager will prepare a Daily QC Report for the project. The report will identify the definable features of work underway and the appropriate control phase (see Section 6.1).

6.2.6 QC Meeting Minutes

The SQA will prepare minutes and provide a copy to the ROICC and EAD within two days of the QC meeting. The SQA will notify the ROICC and EAD at least 48 hours in advance of each meeting.

6.2.7 As-Builts

As-Built Records of the project specifications and drawings will be maintained onsite.

6.2.8 Test Plan And Log

As tests are performed, pertinent information will be recorded on the Testing Plan and Log. This information will be forwarded to the ROICC and EAD at the end of each month.

6.2.9 Monthly Status Reports

ICHOR will prepare a Monthly Status Report on the project. This report will document work progress, work begun in the period, work to be started in the next period, work completed in the period, work to be completed in the next period, pending action items, rework items, QA/QC issues, changes, and other pertinent information.

6.2.10 Monthly Rework Item List

ICHOR will prepare and forward an updated Rework Items List to the ROICC and EAD at the end of each month.

6.2.11 Contractor Close-out Report

The Final Construction Report will be an addendum to the Construction Close-out Report. It will be submitted to the Navy following the completion of the operation and maintenance phase of the project. This report will include an introduction, summary of actions, final health and safety report, summary of record documents, field changes and contract modifications, final documents, field test and laboratory analytical results, validation results, verification of off-site transportation and treatment of materials, and quality control summary report.

6.3 SUBMITTAL REGISTER

A copy of the completed Submittal Register is included in the Work Plan Figure 6-4. ICHOR will update the Submittal Register.. Submittals will be approved by the government or contractor as identified in column "d" of the register. All submittals will be transmitted to the government through ICHOR. An updated Submittal Register will be kept onsite.

6.4 TESTING LABORATORY QUALIFICATION

The testing laboratories chosen to perform quality assurance testing for this project will meet the requirements of the USN for QA testing facilities.

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
	01010	SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---	---
1	01010	Work Plan (Draft)	1.2.1.1	COTR[1], NTR[2], ROICC[3]	1	6/20/97			6/20/97						
1a	01010	Work Plan (Final)	1.2.1.1	COTR[1], NTR[2], ROICC[3]		8/8/97									
2	01010	As Built Records	1.3.1.1	ROICC		1/23/98									
3	01010	Environmental Conditions Report	1.3.1.2	ROICC		9/19/97									
4	01010	Network Analysis Diagram	1.3.1.3	ROICC		8/8/97									
5	01010	Status Reports	1.3.1.3	ROICC		monthly									
6	01010	QC Meeting Minutes	1.3.1.4	ROICC		weekly									
7	01010	Test Results Summary Report	1.3.1.5	ROICC		1/23/98									
8	01010	Contractor Production Report	1.3.1.6	ROICC		daily									
9	01010	QC Report	1.3.1.7	ROICC		daily									
10	01010	Rework Items List	1.3.1.8	ROICC		as needed									
11	01010	Permits	1.3.1.9	ROICC		9/19/97									
12	01010	Contractor's Close-out Report	1.3.1.10	ROICC		1/23/98									
	01561	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
13	01561	Sediment Fence	2.2	Contractor		9/19/97									
14	01561	Dust Suppressors	2.5	Contractor		9/19/97									
	01561	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
15	01561	Erosion Control Plan	1.5	ROICC		8/8/97									
	01561	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
16	01561	Construction Sequence Schedule	1.3.3.1	ROICC		8/8/97									
	01783	SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---	---
17	01783	Concept Submittal	1.5.1	ROICC		10/24/97									
18	01783	Preliminary Submittal	1.5.2	ROICC		11/20/97									
19	01783	Prefinal Submittal	1.5.3	ROICC		12/5/97									
20	01783	Final Submittal	1.5.4	ROICC		12/19/97									
	02220	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
21	02220	Fill and Backfill Tests	3.10.2.1	Contractor		as needed									
22	02220	Porous Fill Tests	3.10.2.3	Contractor		as needed									
23	02220	Density Tests	3.10.2.4	Contractor		as needed									
	02222	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
24	02222	Excavation and Material Handling Plan	1.4.1	ROICC		9/26/97									
25	02222	Site Health and Safety Plan	1.4.1	ROICC		8/8/97									
26	02222	Field Sampling and Laboratory Testing Plan	1.4.1	ROICC		8/8/97									
	02223	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
27	02223	Treatment Facility Permit	1.1.1.1	ROICC		9/26/97									
	02223	SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---	---
28	02223	Shipment Manifests	1.1.2.1	Contractor		1/23/98									
29	02223	Delivery Certificates	1.1.2.2	Contractor		1/23/98									
30	02223	Disposal Site Decontamination Certificate	1.1.2.3	Contractor		1/23/98									
31	02223	Work Site Decontamination Certificate	1.1.2.4	Contractor		1/23/98									
32	02223	Treatment and Disposal Certificates	1.1.2.5	Contractor		1/23/98									
	02900	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
33	02900	Well Casing	2.2.1	Contractor		9/26/97									

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
34	02900	Well Screen	2.2.2	Contractor		9/26/97									
35	02900	Filter Pack Gradation Analysis	2.2.3	Contractor		9/26/97									
36	02900	Free Product Recovery Equipment	2.4	ROICC		9/26/97									
37	02900	Recovery Wellhead	2.3	Contractor		9/26/97									
38	02900	Carrier Pipe	2.5	Contractor		9/26/97									
	02900	SD-13, Certificates	---	---	---	---	---	---	---	---	---	---	---	---	---
39	02900	Groundwater Recovery Plans and Reports	3.5	Contractor		9/26/97									
	02900	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
40	02900	Laboratory Tests	3.10	Contractor		1/23/98									
	02900	SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---	---
41	02900	Groundwater Recovery Equipment	2.4	Contractor		10/24/97									
	02901	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
42	02901	Well Casing	2.2.1	Contractor		9/26/97									
43	02901	Well Screen	2.2.1	Contractor		9/26/97									
44	02901	Manhole Sections, Slabs, Frames, and Covers	2.2.3	Contractor		9/26/97									
45	02901	Casing Pipe	2.2.1	Contractor		9/26/97									
46	02901	Air Lines	2.3.6	Contractor		9/26/97									
47	02901	SVE Unit	2.3	Contractor		9/26/97									
	02901	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
48	02901	SVE Unit	2.3	Contractor		9/26/97									
	02901	SD-8, Certificates	---	---	---	---	---	---	---	---	---	---	---	---	---
49	02901	Filter Pack Gradation Analysis	2.2.2	Contractor		9/26/97									
	02901	SD-19, Operation and Maintenance Data	---	---	---	---	---	---	---	---	---	---	---	---	---
50	02901	SVE System, Data Package 4	1.3.3	Contractor		10/24/97									
	04200	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
51	04200	Masonry Accessories	1.2.1	Contractor		10/17/97									
52	04200	Pre-mixed Mortar	1.2.1	Contractor		10/17/97									
53	04200	Flashing	1.2.1	Contractor		10/17/97									
	04200	SD-5, Design Data	---	---	---	---	---	---	---	---	---	---	---	---	---
54	04200	Pre-mixed Mortar	1.2.3	Contractor		10/17/97									
	04200	SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
55	04200	Masonry Cement	1.2.4	Contractor		10/17/97									
	04200	SD-11, Factory Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
56	04200	Efflorescence Test	1.2.5	Contractor		10/17/97									
	04200	SD-13, Certificates	---	---	---	---	---	---	---	---	---	---	---	---	---
57	04200	Water Repellant Admixture	1.2.6	Contractor		10/17/97									
	04200	SD-14, Samples	---	---	---	---	---	---	---	---	---	---	---	---	---
58	04200	Masonry Units	1.2.7	ROICC		10/10/97									
59	04200	Mortar Color	1.2.7	ROICC		10/10/97									
	05500	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
60	05500	Floor Gratings	2.3	Contractor		10/3/97									
	05500	SD-04 Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
61	05500	Floor Gratings	2.3	Contractor		10/3/97									
	06100	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
62	06100	Pre-fabricated Wood Trusses	1.2.1.1	Contractor		10/10/97									
	06100	SD-11, Factory Test Report	---	---	---	---	---	---	---	---	---	---	---	---	---
63	06100	Preservative-treated lumber and plywood	1.2.4	Contractor		10/10/97									

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
	07220	SD-02, Manufacturers Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
64	07220	Fasteners	2.5	Contractor		10/10/97									
65	07220	Insulation	2.1	Contractor		10/10/97									
	07311	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
66	07311	Shingles	2.1.1	Contractor		10/10/97									
	07311	SD-03, Manufacturer's Standard Color Charts	---	---	---	---	---	---	---	---	---	---	---	---	---
67	07311	Shingles	1.3.2	Contractor		10/10/97									
	07311	SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
68	07311	Shingles	1.3.3	Contractor		10/10/97									
	07920	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
69	07920	Sealants	2.1	Contractor		10/17/97									
70	07920	Primers	2.2	Contractor		10/17/97									
71	07920	Bond Breakers and Backstops	2.3	Contractor		10/17/97									
	08110	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
72	08110	Doors	2.1	Contractor		10/17/97									
73	08110	Frames	2.2	Contractor		10/17/97									
74	08110	Louvers	1.2.1	Contractor		10/17/97									
	08110	SD-03, Manufacturer's Standard Color Charts	---	---	---	---	---	---	---	---	---	---	---	---	---
75	08110	Factory-applied Enamel Finish	2.5.2	ROICC		10/10/97									
	08110	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
76	08110	Doors	1.2.3	ROICC		10/10/97									
77	08110	Frames	1.2.3	Contractor		10/10/97									
	08331	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
78	08331	Rolling Service Doors	2.1	Contractor		10/17/97									
	08331	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
79	08331	Rolling Service Doors	1.2.2	Contractor		10/17/97									
	08331	SD-06 Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
80	08331	Rolling Service Doors	1.2.3	Contractor		10/17/97									
	08331	SD-19 Operation and Maintenance Manual	---	---	---	---	---	---	---	---	---	---	---	---	---
81	08331	Rolling Service Doors	1.2.4	Contractor		10/17/97									
	08710	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
82	08710	Hardware items	2.3	Contractor		10/17/97									
	08710	SD-06 Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
83	08710	Installation	3.1	Contractor		10/17/97									
	08710	SD-07 Schedules	---	---	---	---	---	---	---	---	---	---	---	---	---
84	08710	Hardware Schedule	1.2.3.1	ROICC		10/17/97									
	08710	SD-19 Operation and Maintenance Manual	---	---	---	---	---	---	---	---	---	---	---	---	---
85	08710	Hardware Schedule Items - Data Package 1	1.2.5	Contractor		10/17/97									
	10201	SD-03 Manufacturer's Standard Color Chart	---	---	---	---	---	---	---	---	---	---	---	---	---
86	10201	Wall Louvers	2.2	ROICC		10/10/97									
	10201	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
87	10201	Wall Louvers	1.2.2	Contractor		10/17/97									
	11302	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
88	11302	Separator	2.1	ROICC		11/7/97									
	11302	SD-05, Design Data	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
89	11302	Separator	1.3.2	ROICC		11/7/97									
	11302	SD-06 Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
90	11302	Separator	1.2.3	ROICC		11/7/97									
	11302	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
91	11302	Inspection	1.5.4	Contractor		1/23/98									
92	11302	Preoperational Test	3.2.1	Contractor		1/23/98									
93	11302	In-service Test	3.2.2	Contractor		1/23/98									
	11302	SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---	---
94	11302	Separator and All Necessary Equipment	1.2.6	Contractor		11/7/97									
	11303	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
95	11303	Transfer Pumps	2.2	ROICC		11/7/97									
96	11303	Sump Pump	2.2	ROICC		11/7/97									
	11303	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
97	11303	Transfer Pumps	2.2	ROICC		11/7/97									
98	11303	Sump Pump	2.2	ROICC		11/7/97									
	11303	SD-12 Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
99	11303	Field Equipment Test	3.2.1	Contractor		1/23/98									
	11303	SD-19, Operation and Maintenance Manuals	---	---	---	---	---	---	---	---	---	---	---	---	---
100	11303	Centrifugal Pump System - Data Package 3	2.2	Contractor		11/7/97									
	13210	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
101	13210	Tank	2.1.1	ROICC		11/7/97									
102	13210	Liquid Level Indicator	2.3.3	ROICC		11/7/97									
103	13210	Saddles	2.3.2	Contractor		11/7/97									
104	13210	Tank Finish	2.2	Contractor		11/7/97									
	13210	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
105	13210	Tank	1.3.2	ROICC		11/7/97									
106	13210	Liquid Level Indicator	1.3.2	ROICC		11/7/97									
107	13210	Saddles	1.3.2	Contractor		11/7/97									
108	13210	Tank Finish	1.3.2	Contractor		11/7/97									
	13321	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
109	13321	Flow Measuring Equipment Components	2.1	ROICC		11/7/97									
110	13321	Read-out Device	2.2	ROICC		11/7/97									
	13321	SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
111	13321	Flow Measuring Equipment Components	1.3.2	Contractor		11/7/97									
	13321	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
112	13321	Dimensional Inspection Report	1.3.3.1	Contractor		1/23/98									
113	13321	Closed Channel Test	1.3.3.1	Contractor		1/23/98									
	15400	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
114	15400	Pipe and Fittings	2.1	Contractor		11/21/97									
115	15400	Valves	2.2	Contractor		11/21/97									
116	15400	Pipe Hangers and Supports	2.5.4	Contractor		11/21/97									
117	15400	Pressure Gages	2.3	Contractor		11/21/97									
	15501	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
118	15501	Unit Heaters	2.1.1	ROICC		10/31/97									
119	15501	Exhaust Fans	2.1.2	ROICC		10/31/97									
	15501	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
120	15501	Temperature Control Systems	1.3.2.1	ROICC		10/31/97									

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
	15501	SD-06, Instructions	---	---	---	---	---	---	---	---	---	---	---	---	---
121	15501	Installation Manual	1.3.3.1	Contractor		10/31/97									
	15501	SD-19, Operation and Maintenance Manual	---	---	---	---	---	---	---	---	---	---	---	---	---
122	15501	Unit Heaters - Data Package 2	1.3.4	Contractor		10/31/97									
123	15501	Exhaust Fans - Data Package 2	1.3.4	Contractor		10/31/97									
	16301	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
124	16301	Conduit	2.1.1	Contractor		11/7/97									
125	16301	Fittings	2.1.2	Contractor		11/7/97									
126	16301	Insulating Tape	2.1.3.1	Contractor		11/7/97									
127	16301	Conductors Rated 600 Volts and Less	2.1.4.1	Contractor		11/7/97									
128	16301	Cable Lubricants	3.1.6.1	Contractor		11/7/97									
	16402	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
129	16402	Switches	2.11	ROICC		11/7/97									
130	16402	Receptacles	2.12	ROICC		11/7/97									
131	16402	Circuit Breakers	2.13.2	ROICC		11/7/97									
132	16402	Transformers	2.18	ROICC		11/7/97									
133	16402	Enclosed Circuit Breakers	2.15	ROICC		11/7/97									
134	16402	Motor Controllers	2.20	ROICC		11/7/97									
135	16402	Manual Motor Controllers	2.20	ROICC		11/7/97									
136	16402	Combination Motor Controllers	2.20	ROICC		11/7/97									
	16402	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
137	16402	Panelboards	2.13	ROICC		11/7/97									
138	16402	Transformers	2.18	ROICC		11/7/97									
	16402	SD-09, Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
139	16402	Transformer Design and Prototype Tests	1.3.3.2	ROICC		11/7/97									
	16402	SD-11, Factory Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
140	16402	Transformer Tests	1.3.4.1	Contractor		11/7/97									
	16402	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
141	16402	600-Volt Wiring Test	3.2.2	ROICC		1/23/98									
142	16402	Grounding System Test	3.2.6	ROICC		1/23/98									
143	16402	Transformer Tests	3.2.3	ROICC		1/23/98									
144	16402	GFI per ISR Receptacle Test	3.2.4	ROICC		1/23/98									
	16510	SD-02, Manufacturer's Catalog Data	---	---	---	---	---	---	---	---	---	---	---	---	---
145	16510	Fluorescent Lighting Fixtures	2.1	ROICC		11/7/97									
146	16510	Florescent Electronic Ballasts	2.1.1	ROICC		11/7/97									
147	16510	Fluorescent Lamps	2.1.3	ROICC		11/7/97									
148	16510	High-Intensity-Discharge (HID) Lighting Fixtures	2.2	ROICC		11/7/97									
149	16510	HID Ballasts	2.2.1	ROICC		11/7/97									
150	16510	High-Pressure Sodium (HPS) Lamps	2.2.2	ROICC		11/7/97									
151	16510	Photocell Switch	2.9	ROICC		11/7/97									
152	16510	Exit Signs	2.11	ROICC		11/7/97									
153	16510	Emergency Lighting Equipment	2.12	ROICC		11/7/97									
	16510	SD-08, Statements	---	---	---	---	---	---	---	---	---	---	---	---	---
154	16510	Qualification of Manufacturer	1.4.2	ROICC		11/7/97									
	16510	SD-12, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
155	16510	Operating Test	3.2	Contractor		1/23/98									
	16510	SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---	---
156	16510	Information Card	1.4.5.1	ROICC		1/23/98									

Table 6-1

Submittal Register

Contract Number N62470-93-D-3033 D.O. 0017			Title: Tank Farm B-Aquifer Remediation System				Location: MCAS Cherry Point, NC				Contractor: ICHOR Services, Inc.				
							Contractor Action			Approving Authority Action				Contractor	
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 viewer	Action Code	Date of Action	Mailed to Contr / Recd from Appr Authority	Remarks
a	b		c	d	e	f	g	h	i	j	k	l	m	n	o
	16670	SD-04, Drawings	---	---	---	---	---	---	---	---	---	---	---	---	---
157	16670	Lightning Protection System	1.3.1	ROICC		1/23/98									
	16670	SD-13, Certificates	---	---	---	---	---	---	---	---	---	---	---	---	---
158	16670	UL Listing or Label	1.3.2	ROICC		1/23/98									
	16670	SD-11, Field Test Reports	---	---	---	---	---	---	---	---	---	---	---	---	---
159	16670	Grounding System Test	3.5.1	Contractor		1/23/98									
	16670	SD-18, Records	---	---	---	---	---	---	---	---	---	---	---	---	---
160	16670	Project Record Documents	1.3.4	ROICC		1/23/98									

[1] COTR - Contracting Officer's Technical Representative

[2] NTR - Navy Technical Representative

[3] ROICC - Resident Officer in Charge of Construction

Figure 6-1

CONTRACTOR QUALITY CONTROL REPORT (ATTACH ADDITIONAL SHEETS IF NECESSARY)	SHEET ___ of ___	DATE

CONTRACT NO.	DELIVERY ORDER #	CONTRACTOR
N62470-93-D-3033	0017	

PHASE	Y - YES, N- NO, SEE REMARKS BLANK - NOT APPLICABLE		IDENTIFY DEFINABLE FEATURES OF WORK, LOCATION, AND *LIST PERSONNEL PRESENT*	
PREPARATORY	THE PLANS AND SPECS HAVE BEEN REVIEWED			
	THE SUBMITTALS HAVE BEEN APPROVED			
	MATERIALS COMPLY WITH APPROVED SUBMITTALS			
	MATERIALS STORED PROPERLY			
	TESTING PLAN HAS BEEN REVIEWED			
	WORK METHOD AND SCHEDULE DISCUSSED			
INITIAL	PRELIMINARY WORK WAS DONE CORRECTLY			TESTING PERFORMED AND WHO PERFORMED TEST
	SAMPLE HAS BEEN PREPARED/APPROVED			
	WORKMANSHIP IS SATISFACTORY			
	TEST RESULTS ARE ACCEPTABLE			
	WORK IS IN COMPLIANCE WITH THE CONTRACT			
FOLLOW UP	WORK COMPLIES WITH CONTRACT AS APPROVED IN INITIAL PHASE			TESTING PERFORMED AND WHO PERFORMED TEST
	COMPLETION INSPECTION			

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)	REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

REMARKS:

On behalf of the contractor, I certify that this report is complete and correct and equipment and materials 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.

AUTHORIZED QC MANAGER AT SITE ___ DATE ___

GOVERNMENT QUALITY ASSURANCE REPORT DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

GOVERNMENT QUALITY CONTROL MANAGER ___ DATE ___

Figure 6-2

DEFICIENCY REPORT

CONTRACT NO.	D. O. NO.	REPORT NO.
JOB TITLE		

DESCRIPTION OF NONCOMPLIANCE

Noncompliance _____

_____

_____

_____

_____

_____

Suggested Corrective Action _____

_____

_____

_____

_____

_____

_____

_____

_____

SUPERINTENDENT NOTIFIED	DATE
QC INSPECTOR	DATE
ACTION TAKEN TO RESOLVE	
CLOSING INSPECTOR	DATE

Figure 6-3

REWORK ITEMS LIST

Sheet ____ of ____

CONTRACT NO: N62470-93-D-3033 **D.O. No.** 0017

PROJECT TITLE AND LOCATION: Remediation Tank Farm B at MCAS Cherry Point, NC **CONTRACTOR:** _____

NO.	DATE IDENTIFIED	DEFICIENCY REPORT NO. (If applicable)	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No., and Detail No., etc.)	ACTION TAKEN BY PQC MANAGER	RESOLUTION	DATE CORRECTED

ATTACHMENT

PQC Manager Appointing SQA, Invoice QCA, and Submittal QCA Personnel.

J.A. JONES
CONSTRUCTION

June 20, 1997

Mr. Dave Rykaczewski
ICHOR Services, Inc
300 Oxford Drive
Monroeville, NC 15146

RE: Contract N62470-93-D-3033
Delivery Order 017

Dear Mr Rykaczewski:

This letter is to appoint you as the Project Submittal QC Administrator for J.A. Jones Environmental Services for this Delivery Order. In this position, you are responsible for the review and approval of contractually required submittals. .

If you have any questions, please do not hesitate to call me.

Sincerely,
J.A. Jones Construction Company

Marshall D. Sealey
Program Quality Control Manager

J.A. JONES
CONSTRUCTION

June 20, 1997

Mr. B. Buccille
ICHOR Services, Inc
300 Oxford Drive
Monroeville, PA 15146

RE: Contract N62470-93-D-3033
Delivery Order 017

Dear Mr Buccille:

This letter is to appoint you as the Invoice Quality Control Administrator for J.A. Jones Environmental Services for this Delivery Order. In this position, you are responsible for the review of invoice coding and cost allocation for this Delivery Order.

If you have any questions, please do not hesitate to call me.

Sincerely,
J.A. Jones Construction Company

Marshall D. Sealey
Program Quality Control Manager

J.A. JONES
CONSTRUCTION

June 20, 1997

Mr. William Greaff
ICHOR Services, Inc
300 Oxford Drive
Monroeville, PA 15146

RE: Contract N62470-93-D-3033
Delivery Order 017

Dear Mr Greaff:

This letter is to appoint you as the Site Quality Administrator (SQA) for J.A. Jones Environmental Services for this Delivery Order. As the SQA you are authorized and directed to perform those duties as specified in the Program Quality Control Plan. Some of your responsibilities identified in the plan are restated below for further emphasis:

1. Responsible for attending the coordination and mutual understanding meeting.
2. Responsible for performing the Three Phases of Control.
3. Responsible for conducting the QC meetings.
4. Responsible for performing or directing the performance of inspection and testing activities.
5. Responsible for identifying unsatisfactory work and having it corrected.
6. Responsible for maintaining a Rework Item List.
7. Responsible for monitoring construction/remediation activities.

If you have any questions, please do not hesitate to call me.

Sincerely,
J.A. Jones Construction Company

Marshall D. Sealey
Program Quality Control Manager

7.0 TECHNICAL SPECIFICATIONS ERRATA

This section of the Work Plan includes Technical Specifications which are necessary to accurately describe the materials and workmanship required to meet the requirements of the delivery order. As instructed by LANTDIV, Section 01783, Environmental Facility User Manuals, has been added to the technical specifications.

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01010 GENERAL PARAGRAPHS
01561 EROSION AND SEDIMENT CONTROL DATA
01730 OPERATION AND MAINTENANCE DATA
01783 ENVIRONMENTAL FACILITY USERS MANUAL

DIVISION 02 - SITE WORK

02220 GENERAL EXCAVATION, FILLING, AND BACKFILLING
02222 EXCAVATION, REMOVAL, AND TREATMENT OF PETROLEUM CONTAMINATED MATERIAL
02223 TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL
02900 FREE PRODUCT RECOVERY SYSTEM
02901 SOIL VAPOR EXTRACTION SYSTEM

DIVISION 03 - CONCRETE

03302 CAST-IN-PLACE CONCRETE

DIVISION 04 - MASONRY

04200 UNIT MASONRY

DIVISION 05 - METALS

05500 METAL FABRICATIONS

DIVISION 06 - WOODS & PLASTICS

06100 ROUGH CARPENTRY
06200 FINISH CARPENTRY

DIVISION 07 - THERMAL & MOISTURE PROTECTION

07112	BITUMINOUS DAMPPROOFING
07220	ROOF INSULATION
07311	ASPHALT SHINGLES
07600	FLASHING AND SHEET METAL
07920	SEALANTS

DIVISION 08 - DOORS & WINDOWS

08110	STEEL DOORS AND FRAMES
08331	ROLLING SERVICE DOORS
08710	FINISH HARDWARE

DIVISION 10 - SPECIALTIES

10201	METAL LOUVERS

DIVISION 11 - EQUIPMENT

11302	PACKED, GRAVITY OIL-WATER SEPARATOR
11303	PUMPS: WATER, CENTRIFUGAL

DIVISION 13 - SPECIAL CONSTRUCTION

13210	ABOVEGROUND STORAGE TANKS

DIVISION 15 - MECHANICAL

15050	BASIC MECHANICAL MATERIALS AND METHODS
15700	VENTILATING SYSTEM

DIVISION 16 - ELECTRICAL

16011	ELECTRICAL GENERAL REQUIREMENTS
16301	UNDERGROUND ELECTRICAL WORK
16402	INTERIOR WIRING SYSTEMS
16510	INTERIOR LIGHTING
16670	LIGHTNING PROTECTION SYSTEM

8.0 CONTRACTOR - GENERATED CONSTRUCTION DRAWINGS

The construction of D.O. No. 0017 will be based on the drawings provided by the USN. These are as follows.

DRAWING NO.	TITLE	STATUS
USN T-1	Cover Sheet	
USN C-1	Site Plan, Existing Conditions	
USN C-2	Site Plan, Existing Conditions	
USN C-3	Utility Plan	
USN C-4	Utility Plan	
USN C-5	Site Environmental Conditions	
USN C-6	Groundwater Treatment Schematic Flow Diagram	
USN C-7	Equipment Layout	
USN C-8	Equipment Elevations	
USN C-9	Details	
USN C-10	Infiltration Gallery A Plan and Details	
USN C-11	Infiltration Gallery B Plan	
USN C-12	Infiltration Gallery C Plan	
USN C-13	Infiltration Gallery D Plan	
USN B-1	Boring Logs	
USN A-1	Equipment Building Elevations	
USN A-2	Equipment Building Details	
USN S-1	Truck Loading Containment Basin Foundation Plan And Details	
USN S-2	Equipment Building Foundation Plan And Details	
USN S-3	Equipment Building Drainage Plan And Details	
USN M-1	Heating And Ventilation Equipment Layout	
USN M-2	Heating And Ventilation Schedules, Details And Abbreviations	
USN E-1	Electrical Abbreviations, Legend And Notes	
USN E-2	Electrical Site Plan	
USN E-3	Electrical Equipment Power Plan	
USN E-4	Electrical Lighting Plan	
USN E-5	Electrical Details And Schedules	
USN E-6	Electrical Panel Schedules	
USN E-7	Electrical Fixture Details	
USN I-1	Control Logic	

Contractor Generated Construction drawings are included in this Work Plan to illustrate the facility layout, construction details and the remediation system layout. The following drawings are included in this Work Plan.

DRAWING NO.	TITLE
T-1	Title Sheet
SK-1	Site Plan
SK-2	Temporary Facilities - Sheet 1 of 2
SK-3	Temporary Facilities - Sheet 2 of 2
SK-4	Erosion & Sediment Control Plan - Sheet 1 of 2
SK-5	Erosion & Sediment Control Plan - Sheet 2 of 2
SK-6	Erosion & Sediment Control Details
C-1	Utility Building and Installation Plan
C-2	Equipment Layout
C-3	Civil Details
S-1	Building Elevations
S-2	Building Foundation - Plan
S-3	Building Foundation - Details
S-4	Building - Plan and Details
S-5	Roof Framing - Plan and Details
M-1	Ventilation Equipment - Layout and Details
I-1	Control Logic
E-1	Electrical Site Plan
E-2	Electrical Equipment - Power Plan
E-3	Electrical Equipment - Lighting Plan
E-4	Electrical Equipment - Details & Schedules

9.0 REFERENCES

North Carolina Sediment Control Commission, "Erosion and Sediment Control Planning and Design Manual," 1993.

American Red Cross, "Standard First Aid", 1993.

Code of Federal Regulations, "OSHA Safety and Health Standards, 29 CFR 1910 and 1926" (specifically 1910.120), Revised July 1, 1994.

United Stated Department of Health and Human Services, "NIOSH/OSHA/USCG/USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", October, 1985.

United Stated Department of Health and Human Services, NIOSH, "A Guide to Industrial Respiratory Protection", September, 1987.

USEPA, "Standard Operating Safety Guides", June, 1992.

United Stated Department of Health and Human Services, NIOSH, "Pocket Guide to Chemical Hazards", June, 1990.

ACGIH, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices", 1994.

U.S. Army Corps of Engineers, "Safety and Health Requirements Manual", EM-385-1-1, October 1992.

Richard J. Lewis, Sr., "Hazardous Chemicals Desk Reference", Third Edition, 1993.

Final Corrective Action Plan, Tank Farm B, Marine Corps Air Station, Cherry Point, North Carolina, Law Engineering, Inc., October 13, 1993, (Contract Nos. N62470-90-D-7625/0001 and N62470-90-D-7625/0005)

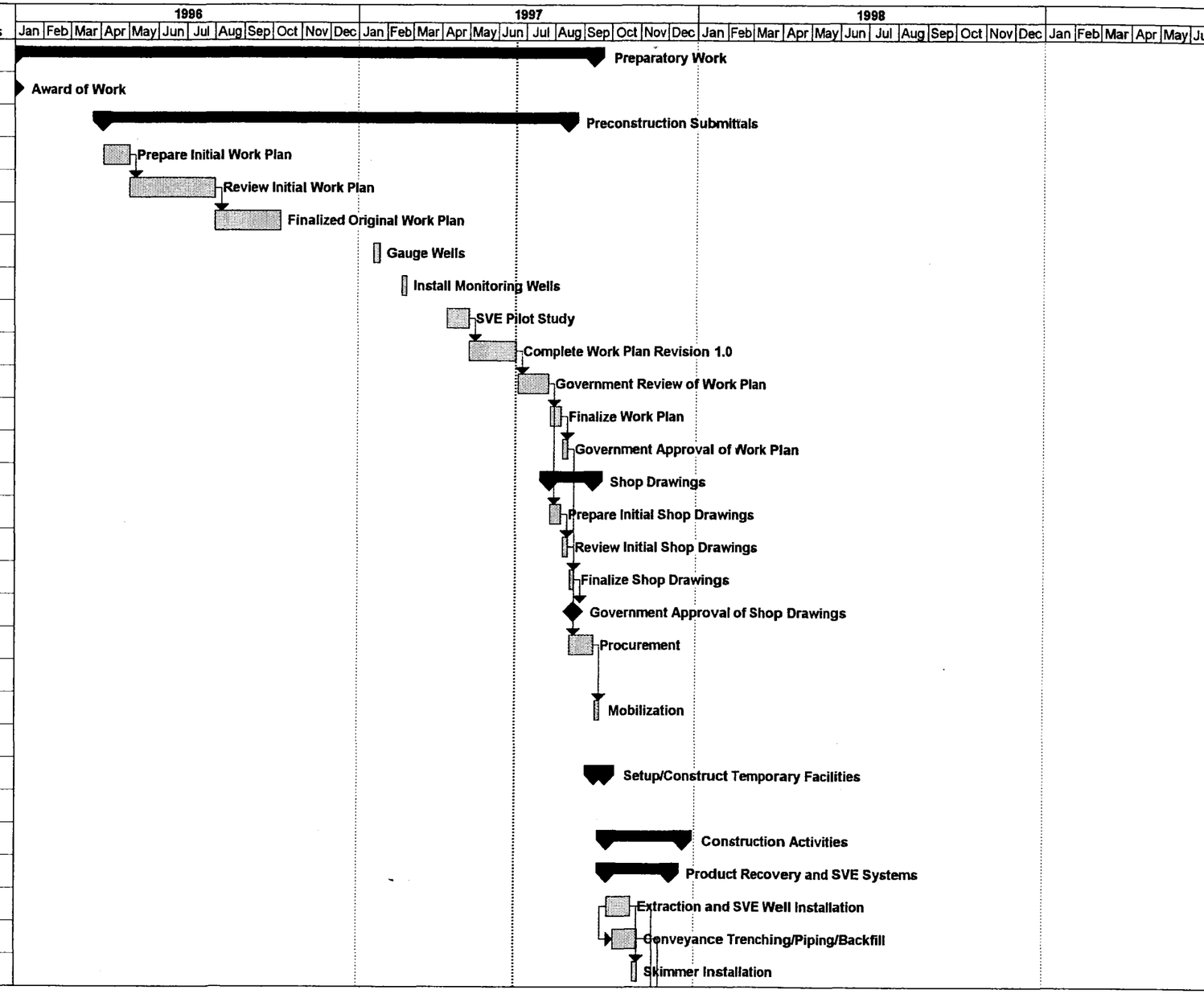
Department of the Navy, Atlantic Division, Contract No. N62470-93-D-3033/Delivery Order No. 0017.

APPENDIX A

Construction Schedule

Delivery Order 0017
Tank Farm B Remediation
MCAS Cherry Point, NC

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Preparatory Work**	**445d**	**1/1/96**	**9/12/97**	
2	**Award of Work**	**0d**	**1/1/96**	**1/1/96**	
3	**Preconstruction Submittals**	**357d**	**4/4/96**	**8/15/97**	
4	Prepare Initial Work Plan	20d	4/4/96	5/1/96	
5	Review Initial Work Plan	65d	5/2/96	7/31/96	4
6	Finalized Original Work Plan	50d	8/1/96	10/9/96	5
7	Gauge Wells	5d	1/17/97	1/23/97	
8	Install Monitoring Wells	5d	2/17/97	2/21/97	
9	SVE Pilot Study	18d	4/7/97	4/30/97	
10	Complete Work Plan Revision 1.0	37d	5/1/97	6/20/97	9
11	Government Review of Work Plan	25d	6/23/97	7/25/97	10
12	Finalize Work Plan	10d	7/28/97	8/8/97	11
13	Government Approval of Work Plan	5d	8/11/97	8/15/97	12
14	**Shop Drawings**	**35d**	**7/28/97**	**9/12/97**	
15	Prepare Initial Shop Drawings	10d	7/28/97	8/8/97	11
16	Review Initial Shop Drawings	5d	8/11/97	8/15/97	15
17	Finalize Shop Drawings	5d	8/18/97	8/22/97	16
18	Government Approval of Shop Drawings	0d	8/22/97	8/22/97	17
19	Procurement	20d	8/18/97	9/12/97	13
20					
21	**Mobilization**	**5d**	**9/15/97**	**9/19/97**	**19**
22					
23	**Setup/Construct Temporary Facilities**	**10d**	**9/15/97**	**9/26/97**	
30					
31	**Construction Activities**	**60d**	**9/29/97**	**12/19/97**	
32	**Product Recovery and SVE Systems**	**50d**	**9/29/97**	**12/5/97**	
33	Extraction and SVE Well Installation	20d	9/29/97	10/24/97	29
34	Conveyance Trenching/Piping/Backfill	20d	10/6/97	10/31/97	33SS+5d
35	Skimmer Installation	5d	10/27/97	10/31/97	33

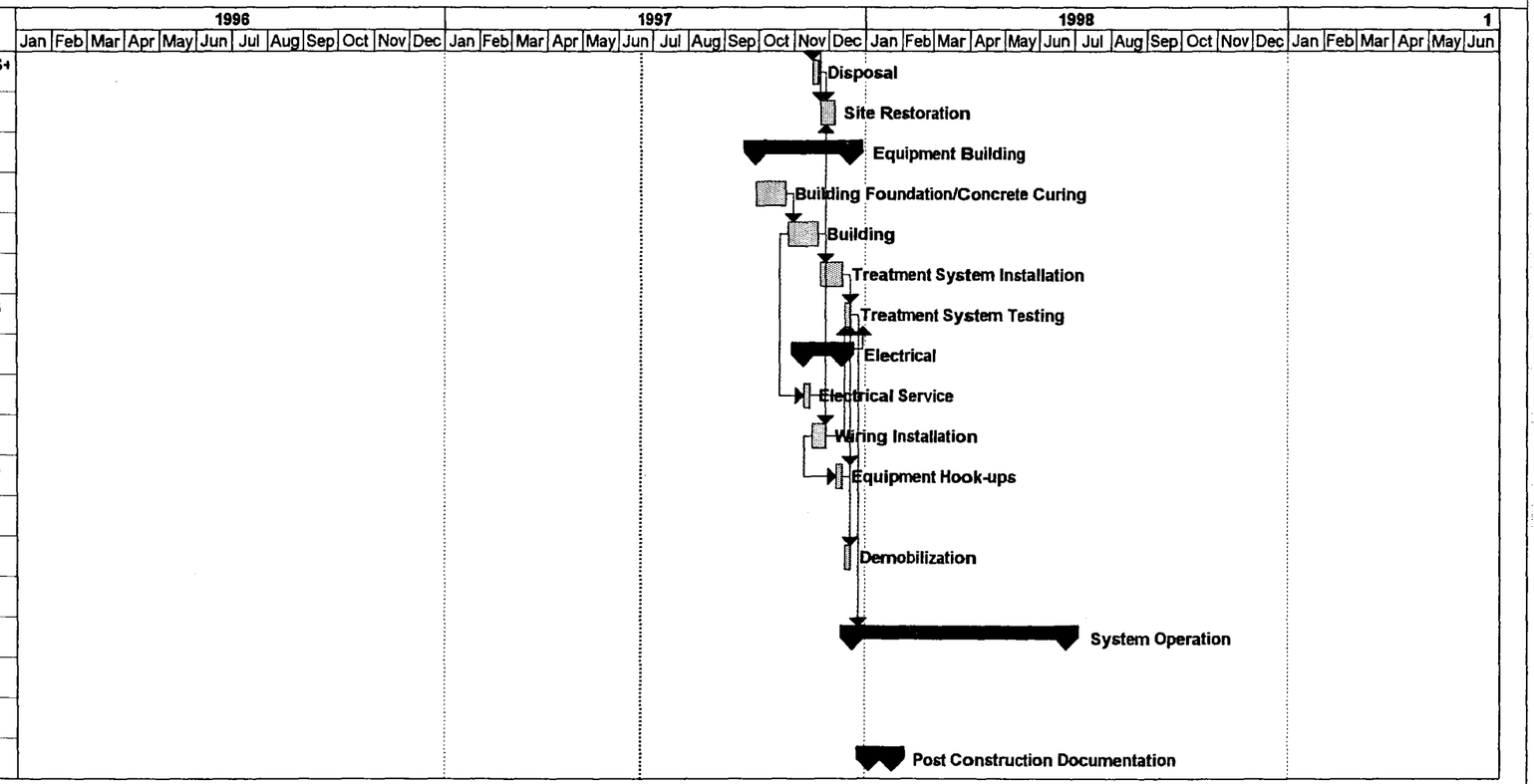


Project: Delivery Order 0017
Date: 6/20/97

Task | Critical Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Critical Task | Rolled Up Milestone | Rolled Up Progress

Delivery Order 0017
Tank Farm B Remediation
MCAS Cherry Point, NC

ID	Task Name	Duration	Start	Finish	Predecessors
36	**Disposal**	**5d**	**11/17/97**	**11/21/97**	**33FS+10d,34FS+**
37	**Site Restoration**	**10d**	**11/24/97**	**12/5/97**	**34,36,40**
38	**Equipment Building**	**60d**	**9/29/97**	**12/19/97**	
39	Building Foundation/Concrete Curing	20d	9/29/97	10/24/97	29
40	Building	20d	10/27/97	11/21/97	39
41	Treatment System Installation	15d	11/24/97	12/12/97	40
42	Treatment System Testing	5d	12/15/97	12/19/97	41,43,44,45,46
43	**Electrical**	**25d**	**11/10/97**	**12/12/97**	
44	Electrical Service	5d	11/10/97	11/14/97	40SS+10d
45	Wiring Installation	10d	11/17/97	11/28/97	40FS-5d
46	Equipment Hook-ups	5d	12/8/97	12/12/97	41FS-5d,45SS
47					
48	Demobilization	5d	12/15/97	12/19/97	41
49					
50	**System Operation**	**133d**	**12/22/97**	**6/24/98**	**42**
53					
55					
56	**Post Construction Documentation**	**15d**	**1/5/98**	**1/23/98**	



Project: Delivery Order 0017
Date: 6/20/97

Task | Critical Task | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Critical Task | Rolled Up Milestone | Rolled Up Progress

APPENDIX B

Erosion and Sediment Control Plan

EROSION AND SEDIMENT CONTROL PLAN

1.0 NARRATIVE

1.1 PROJECT DESCRIPTION

The intent of this project is the construction of a groundwater and free product recovery system designed to recover free phase petroleum contamination from Tank Farm B at Marine Corps Air Station (MCAS) Cherry Point, North Carolina. *Construction will include piping trenches of approximately 2500 feet in length, fifteen free product recovery wells and eight total fluids recovery wells with pumps and associated controls, and a treatment building housing a product recovery and groundwater treatment system.* In addition, temporary facilities will be utilized during the construction activities including an equipment decontamination area, soil staging areas for non-petroleum and petroleum contaminated soil, and site and equipment storage trailers. The area to be disturbed by this construction project will be less than 1.0 acre.

1.2 EXISTING SITE CONDITIONS

The existing site is generally flat. The overall site topography varies between 18 and 32 feet above Mean Sea Level (MSL). The entire project area is accessible by paved and gravel access roads. Site stormwater drainage is by sheet flow to perimeter collection channels. The site is primarily grassy areas.

1.3 ADJACENT AREAS

The project site is located within the boundaries of MCAS Cherry Point. The adjacent areas to the north and west are wooded or grassy areas. The adjacent areas to the south and east are developed areas with airport support facilities and paved areas.

1.4 OFF-SITE AREAS

The construction activities associated with this project will generate excess soils from the excavations. This soil will be segregated based on specified field testing procedures, temporarily stockpiled, sampled and analyzed for potential petroleum, oils, and lubricants (POL). Based on the field testing and laboratory analysis, the soil's final disposition and/or use will be performed in accordance with applicable federal, state, and local regulations.

1.5 SOIL CONDITIONS

The existing site has undergone numerous earthwork activities for the installation of underground piping and utilities for the airport facilities. The present site conditions do not necessarily represent natural soil classification conditions. Soil borings were performed as part of site characterization studies and the boring data indicated the site soil is primarily composed of a thin topsoil layer underlain by sand, silt and clay of varying thickness. The borings were completed

to depths varying between approximately 20 and 25 feet below grade. No bedrock material was encountered at the site.

1.6 CRITICAL AREAS

With the exception of the mounded soil surrounding the fuel storage tanks, surface relief at the site is generally less than 6 feet. As a result, there does not appear to be any critical erosion concerns within this portion of the construction area. Silt fence barriers will be utilized to minimize potential discharge of silts from the construction area to the drainage ditch system.

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 the North Carolina Sediment Control Commission's publication "Erosion and Sediment Control Planning and Design Manual" dated 1993 (NCSCC ESCM).

2.0 STRUCTURAL PRACTICES

2.1 SILT FENCE BARRIER

Silt fence will be installed along the downslope edges of the construction areas, to minimize sheet flow of sediment laden waters onto paved areas or into drainage ditches or storm drain inlets. A manufactured product with posts pre-assembled may be used in place of field assembly of silt fence on post.

2.2 SAFETY FENCE

Plastic safety fence will be installed around excavations which may potentially remain open over night or between work shifts. These excavations may include system piping trenching and building foundations.

2.3 DEWATERING STRUCTURE

Excavated piping trenches and access pits are not expected to require dewatering during construction. If required, the excess water will be discharged through a dewatering structure. Prior to any dewatering activities, the water will be checked for a visible sheen. Dewatering activities will not be performed without the concurrence of the ROICC and Base Environmental Compliance Division. The specific design of the dewatering structure will be at the discretion of the Site Superintendent and subject to compliance with the NCSCC ESCM and the approval of the ROICC.

3.0 VEGETATIVE PRACTICES

Temporary seeding will be applied to disturbed areas which will not be permanently reseeded within 48 hours.

4.0 MANAGEMENT STRATEGIES

The following management strategies and work practices will be observed during the project.

4.1 The Project Superintendent will be responsible for the installation and maintenance of the erosion and sediment control features.

4.2 Erosion and sediment control features will be installed during the first phase of construction operations.

4.3 Seeding and stabilization will follow immediately after final grading is completed.

4.4 After achieving adequate stabilization, the erosion and sediment control features will be removed.

5.0 PERMANENT STABILIZATION

All areas disturbed by construction will be stabilized by seeding and mulching immediately following final grading. Seed, fertilizer, and lime will be applied prior to mulching.

5.1 SEED

Seed type and rates will be provided which meet the requirements of the NCSCC ESCM.

5.2 FERTILIZER

Fertilizer will be applied at the rates indicated in the NCSCC ESCM.

5.3 LIME

Agricultural grade limestone will be applied at the rate indicated in the NCSCC ESCM.

6.0 STORMWATER MANAGEMENT

Since the piping trenches will be returned to their original state and grade upon development of the permanent stabilization, any increases in stormwater runoff due to this project will be minimal. Therefore, no additional stormwater management features will be incorporated in this project design.

7.0 MAINTENANCE

In general, erosion and sediment control features will be inspected daily and after significant rainfall effects. Sediment will be removed whenever it reaches half the height of the fence.

APPENDIX C

Technical Specifications

APPENDIX D

Calculations

Project: MCAS Cherry Point, Tank Farm B
By: KCC Date: 6/16/97

Subject: Product Recovery Lines
Project No.: 945817

Purpose:

Determine pipe sizes for product conveyance from the recovery wells to the treatment building for MCAS Cherry Point Tank Farm B.

Calculation Methodology

The system design consists of product recovery and soil vapor extraction from a network of wells in the vicinity of the affected area. As shown on the drawings, each well is designated as either a product recovery well, soil vapor extraction well, or a dual purpose well. This calculation will size the pipes required to convey the product from the product recovery wells and dual purpose wells to the treatment building.

The piping network shall be constructed using Buna-N hose. The hose will be placed inside SCH 40 PVC containment pipe. Two networks of pipes will be installed, North and South well fields.

Design Objectives

- Maintain fluid velocity in pipes between 2 and 6 feet per second (where possible) to minimize accumulation of silt and sediment in pipes.
- Minimize head losses in pipe runs such that the maxiimum head loss in the longest run of the network does not exceed 25 pounds per square inch (psi) based on the maximum pressure rating of the pumps.
- Minimize the number of pipe sizes required.
- Minimize the largest pipe size reqired.

Assumptions

- Flow rate per well does not exceed 0.2 gallons per minute.
- Hazen-Williams coefficient of 140 is representative for this application.
- Head losses due to pipe contractions are negligible compared to the length of pipe run.

Calculation

The flow rate from each well is known and assumed constant for the purpose of this calculation. Based on the known flow rates, Table 1 showing velocities and head losses (per 100 feet of pipe) has been created for the anticipated range of flow rates and commercially available Buna-N hose sizes. The velocity in the pipe was calculated using the following equation:

$$\text{Velocity} = Q/A, \text{ where}$$

$$A = \text{pi} \times (\text{I.D.})^2/4$$

The head loss per 100 feet of pipe was calculated using the Hazen-Williams formula for turbulent flow:

$$\text{Head Loss / 100 feet} = 10.44 \times L \times (Q^{1.85})/(\text{I.D.}^{4.8655}), \text{ where}$$

L = Length (100 feet)
Q = 5 gpm
C = 140 for Buna-N Hose
I.D. = inner diameter of pipe
10.44 = units conversion factor

The design value for the Hazen-Williams coefficient for Buna-N hose is 155, however, it is conceivable that sediment from the wells may accumulate inside the pipe and reduce the efficiency of the pipe. For this reason the C value was reduced to 140.

Table 2 was formulated to:

- Summarize the pipe sizes for all segments conveying fluids to the treatment system.
- Determine the maximum head loss in the longest run within each network.

For each network, the individual segments and piping lengths have been input. the segments that incorporate the longest run in the network are designated with an X. Based on flow rate, the pipe size and head losses corresponding to the required velocity range were transferred from Table 1. The total head loss was computed and converted to pounds per square inch.

Summary

Based on the design objectives, the Buna-N hose has been designed to meet the required flows. The nominal pipe sizes for each segment are shown on Table 2. The total head loss for the longest pipe run in each network does not exceed 25 psi.

FLOW

		Length	100	feet									
Hazen Williams Coefficient			140										
		Nom. Pipe Size = 1/4 in.		Nom. Pipe Size = 3/8 in.		Nom. Pipe Size = 1/2 in.		Nom. Pipe Size = 5/8 in.		Nom. Pipe Size = 3/4 in.		Nom. Pipe Size = 1 in.	
		Pipe ID (in)	0.2500	Pipe ID (in)	0.3750	Pipe ID (in)	0.5000	Pipe ID (in)	0.6250	Pipe ID (in)	0.7500	Pipe ID (in)	1.0000
No.	Flow	Velocity	Head Loss	Velocity	Head Loss	Velocity	Head Loss	Velocity	Head Loss	Velocity	Head Loss	Velocity	Head Loss
Wells	gpm	fps	per 100 ft.	fps	per 100 ft.	fps	per 100 ft.	fps	per 100 ft.	fps	per 100 ft.	fps	per 100 ft.
1	0.20	1.31	4.84	0.58	0.67	0.33	0.17	0.21	0.06	0.15	0.02	0.08	0.01
2	0.40	2.61	17.44	1.16	2.43	0.65	0.60	0.42	0.20	0.29	0.08	0.16	0.02
3	0.60	3.92	36.92	1.74	5.13	0.98	1.27	0.63	0.43	0.44	0.18	0.25	0.04
4	0.80	5.23	62.86	2.32	8.74	1.31	2.16	0.84	0.73	0.58	0.30	0.33	0.07
5	1.00	6.54	94.99	2.91	13.21	1.63	3.26	1.05	1.10	0.73	0.45	0.41	0.11
6	1.20	7.84	133.10	3.49	18.51	1.96	4.57	1.25	1.54	0.87	0.63	0.49	0.16
7	1.40	9.15	177.02	4.07	24.62	2.29	6.07	1.46	2.05	1.02	0.84	0.57	0.21
8	1.60	10.46	226.63	4.65	31.52	2.61	7.77	1.67	2.63	1.16	1.08	0.65	0.27
9	1.80	11.77	281.80	5.23	39.19	2.94	9.67	1.88	3.26	1.31	1.34	0.74	0.33
10	2.00	13.07	342.45	5.81	47.62	3.27	11.75	2.09	3.97	1.45	1.63	0.82	0.40
11	2.20	14.38	408.48	6.39	56.81	3.60	14.01	2.30	4.73	1.60	1.95	0.90	0.48
12	2.40	15.69	479.82	6.97	66.73	3.92	16.46	2.51	5.56	1.74	2.29	0.98	0.56
13	2.60	16.99	556.40	7.55	77.38	4.25	19.09	2.72	6.44	1.89	2.65	1.06	0.65
14	2.80	18.30	638.16	8.13	88.75	4.58	21.89	2.93	7.39	2.03	3.04	1.14	0.75
15	3.00	19.61	725.04	8.72	100.83	4.90	24.87	3.14	8.40	2.18	3.46	1.23	0.85
16	3.20	20.92	816.98	9.30	113.62	5.23	28.03	3.35	9.46	2.32	3.90	1.31	0.96
17	3.40	22.22	913.95	9.88	127.10	5.56	31.35	3.56	10.59	2.47	4.36	1.39	1.08
18	3.60	23.53	1015.89	10.46	141.28	5.88	34.85	3.76	11.77	2.61	4.85	1.47	1.20
19	3.80	24.84	1122.76	11.04	156.14	6.21	38.51	3.97	13.00	2.76	5.36	1.55	1.32
20	4.00	26.15	1234.52	11.62	171.68	6.54	42.35	4.18	14.30	2.91	5.89	1.63	1.45
21	4.20	27.45	1351.13	12.20	187.90	6.86	46.35	4.39	15.65	3.05	6.45	1.72	1.59
22	4.40	28.76	1472.56	12.78	204.79	7.19	50.51	4.60	17.06	3.20	7.02	1.80	1.73

PRODUCT PIPING LOSS CALCULATIONS - NORTH WELL FIELD											
DO 17	PROJECT NO. 945817										
	Flow Rate/Well (gpm)		0.2								
			SEGMENT		SEGMENT	NOMINAL				TOTAL	SEGMENT
		PIPE	PIPE	NO. WELLS	FLOW RAT	PIPE SIZE	PIPE I.D.	HEAD LOSS	TOTAL HEAD	PRESSURE	PRESSURE
	SEGMENT	LENGTH	LENGTH	IN REACH	(gpm)	(in.)	(in.)	per 100 ft	LOSS (ft)	LOSS (psi)	LOSS (psi)
X	N-2PS TO N-3P	25		1	0.2	0.5	0.5	0.17	0.0425	0.01842375	
X	N-3P TO N-4P	30		2	0.4	0.5	0.5	0.6	0.18	0.07803	
X	N-4P TO N-5PS	25		3	0.6	0.5	0.5	1.27	0.3175	0.13763625	
		80	80							0.13763625	0.13763625
X	N-5PS TO N-7PS	75		4	0.8	0.5	0.5	2.16	1.62	0.70227	
		75	155							0.70227	0.83990625
	N-6PS TO N-7PS	65		1	0.2	0.5	0.5	0.17	0.1105	0.04790175	
X	N-7PS TO JB	175		6	1.2	0.5	0.5	4.57	7.9975	3.46691625	
	TOTALS	175	330							3.514818	4.35472425

PRODUCT PIPING LOSS CALCULATIONS - SOUTH WELL FIELD											
DO 17	PROJECT NO. 945817										
	FLOW RATE/WELL (gom)		0.2								
			SEGMENT		SEGMENT	NOMINAL				TOTAL	SEGEMENT
		PIPE	PIPE	NO. WELLS	FLOW RATE	PIPE SIZE	PIPE I.D.	HEAD LOSS	TOTAL HEAD	PRESSURE	PRESSURE
	SEGMENT	LENGTH	LENGTH	IN REACH	(gpm)	(in.)	(in.)	per 100 ft	LOSS (ft)	LOSS (psi)	LOSS (psi)
	S-1PS TO S-3P	40		1	0.2	0.5	0.5	0.17	0.068	0.029478	
X	S-2PS TO S-3P	45		1	0.2	0.5	0.5	0.17	0.0765	0.03316275	
		45	45							0.03316275	0.03316275
X	S-3P TO S-4PS	45		3	0.6	0.5	0.5	1.27	0.5715	0.24774525	
		45	90							0.24774525	0.280908
X	S-4PS TO S-5P	35		4	0.8	0.5	0.5	2.16	0.756	0.327726	
X	S-5P TO S-6PS	30		5	1	0.5	0.5	3.26	0.977566547	0.423775098	
X	S-6PS TO S-7P	30		6	1.2	0.5	0.5	4.57	1.369719493	0.5937734	
X	S-7P TO S-8PS	40		7	1.4	0.5	0.5	6.07	2.428968786	1.052957969	
		135	225							2.398232467	2.67914047
	S-23PS TO S-24PS	50		1	0.2	0.5	0.5	0.17	0.085	0.0368475	
X	S-25PS TO S-26P	35		1	0.2	0.5	0.5	0.17	0.0595	0.02579325	
X	S-26P TO S-27PS	35		2	0.4	0.5	0.5	0.6	0.21	0.091035	
X	S-27PS TO S-28P	35		3	0.6	0.5	0.5	1.27	0.4445	0.19269075	
X	S-28P TO S-24PS	30		4	0.8	0.5	0.5	2.16	0.648	0.280908	
		135	135							0.590427	0.590427
X	S-24PS TO S-20P	35		6	1.2	0.5	0.5	4.57	1.5995	0.69338325	
X	S-20P TO S-19PS	35		7	1.4	0.5	0.5	6.07	2.1245	0.92097075	
		70	205							1.614354	2.204781
	S-17PS TO S-19PS	60		1	0.2	0.5	0.5	0.17	0.102	0.044217	
X	S-19PS TO S-18P	35		9	1.8	0.5	0.5	9.67	3.3845	1.46718075	
X	S-18P TO S-13PS	35		10	2	0.5	0.5	11.75	4.1125	1.78276875	
		70	275							3.2499495	5.4547305
	S-15PS TO S-13PS	65		1	0.2	0.5	0.5	0.17	0.1105	0.04790175	
X	S-13PS TO S-11P	40		12	2.4	0.5	0.5	16.46	6.584	2.854164	
		40	315							2.854164	8.3088945
	S-10PS TO S-11P	45		1	0.2	0.5	0.5	0.17	0.0765	0.03316275	
X	S-11P TO S-8PS	45		13	2.6	0.5	0.5	19.09	8.5905	3.72398175	
X	S-8PS TO JB	65		20	4	0.5	0.5	42.35	27.5275	11.93317125	
	TOTAL	110	425							15.657153	23.9660475

Project: MCAS Cherry Point, Tank Farm B
By: KCC Date: 6/16/97

Subject: SVE Lines
Project No.: 945817

Purpose

Estiamte piping system pressure losses for DO 17 Tank Farm B soil vapor extraction (SVE) system piping.

Background

Per specifications, the SVE system design case is for approximately 16 CFM per well at 2.5 inches Hg vacuum. This information is obtained from the SVE pilot study performed by Law Engineering (Attachment A). Calculations will be performed for twice the expected flow. Piping sizes will be based on obtaining less than 2 inches Hg losses for twice the expected flow for the longest run of pipe.

Calculation of piping system pressure losses will be performed based on Darcy's Formula. Calculations will be performed using an Excel spreadsheet for each section of piping network.

Calculations

The attached spreadsheet performs the following calculations:

- Flow rate per well is input for twice the expected flow
- Vacuum per well is input at 2.5 inches Hg

Average specific volume is calculated based on well head vacuum and one inch of Hg piping losses. Assume gas properties are similar to air and can be calculated using perfect gas law.

$$\nu = R \times T/(144 \times P)$$

Where: ν = specific volume in ft^3/lbm
$T = 68$ deg F

$$\nu = 53.3 \times (68 + 480)/[144 \times (14.7 - 3.5 \times 0.4912 \text{ "Hg/psi})]$$
$$\nu = 15.05557 \ ft^3/lbm$$

Lengths of pipe runs are based on the drawings provided with the Work Plan.

Pressure drop calculations are based on the following equation. Losses due to pipe fittings are assumed to be negligible compared to long lengths of piping runs.

$$\Delta P = 0.00000336 \times (f \times L \times W^2 \times \nu/d^5) \times 2.036 \text{ "Hg/psi}$$

where:

ΔP is calculated in "Hg
f = piping friction factor from the Moody diagram (assumed to be 0.018)
L = pipe equivalent length in feet
W = flow rate in lbm/hr
ν = gas specific volume in ft^3/lbm
d = nominal pipe inside diameter

Sum Maximum Run is the sum of calculated pressure drops from the listed well to the treatment building.

Conclusions

Pipe sizes selected should provide an adequate balance between pressure loss and piping cost such that a Roots type positive displacement blower can be used for the system.

North SVE

SVE PIPING LOSS CALCULATIONS - NORTH WELL FIELD									
DO 17	PROJECT NO. 945817								
	Flow Rate/Well	32	cfm	e the Expected Flow)					
	Vacuum/Well	2.5	"Hg						
	Ave. Specific Volume	15.05557	ft3/lbm						
			SEGMENT						SEGMENT
		PIPE	PIPE	NO. WELLS	SEGMENT	SEGMENT	PIPE SIZE	TOTAL	TOTAL
	SEGMENT	LENGTH	LENGTH	IN REACH	FLOW RATE	FLOW RATE		LOSS	LOSS
					(cfm)	(lbm/hr)	(in)	("Hg)	("Hg)
	N-1S TO N-5PS	80		1	32	127.53	2	0.075	
X	N-2PS TO N-3P	25		1	32	127.53	2	0.024	
X	N-3P TO N-4P	30		1	32	127.53	2	0.028	
X	N-4P TO N-5PS	25		1	32	127.53	2	0.024	
		80	80					0.075	0.075
X	N-5PS TO N-7PS	75		3	96	382.58	2	0.636	
		75	155					0.636	0.711
	N-6PS TO N-7PS	65		1	32	127.53	2	0.061	
	N-8PS TO N-7PS	85		1	32	127.53	2	0.080	
X	N-7PS TO JB	175		6	192	765.17	4	0.185	
	TOTAL	175	330					0.185	0.897

South SVE

SVE PIPING LOSS CALCULATIONS - SOUTH WELL FIELD									
DO 17	PROJECT NO. 945817								
	Flow Rate/Well	32	cfm	(Twice the Expected Flow)					
	Vacuum/Well	2.5	"Hg						
	Ave. Specific Volume	15.05557	ft3/lbm						
			SEGMENT						SEGMEN
		PIPE	PIPE	NO. WELLS	SEGMENT	SEGMENT	PIPE SIZE	TOTAL	TOTAL
	SEGMENT	LENGTH	LENGTH	IN REACH	FLOW RATE	FLOW RATE		LOSS	LOSS
					(cfm)	(lbm/hr)	(in)	("Hg)	("Hg)
	S-30S TO S-29S	90		1	32	127.53	2	0.085	
X	S-31S TO S-29S	90		1	32	127.53	2	0.085	
X	S-29S TO S-4PS	155		3	96	382.58	2	1.314	
		245	245						
	S-1PS TO S-3P	40		1	32	127.53	2	0.038	
	S-2PS TO S-3P	45		1	32	127.53	2	0.042	
	S-3P TO S-4PS	45		3	96	382.58	2	0.382	
X	S-4PS TO S-5P	35		7	224	892.69	4	0.050	
X	S-5P TO S-6PS	30		7	224	892.69	4	0.043	
X	S-6PS TO S-7P	30		8	256	1020.22	4	0.057	
X	S-7P TO S-8PS	40		8	256	1020.22	4	0.075	
		135	380						
X	S-21S TO S-22S	70		1	32	127.53	2	0.066	
X	S-22S TO S-23PS	85		2	64	255.06	2	0.320	
X	S-23PS TO S-24PS	50		3	96	382.58	2	0.424	
		205	205					0.810	
	S-25PS TO S-26P	35		1	32	127.53	2	0.033	
	S-26P TO S-27PS	35		1	32	127.53	2	0.033	
	S-27PS TO S-28P	35		2	64	255.06	2	0.132	
	S-28P TO S-24PS	30		2	64	255.06	2	0.113	
X	S-24PS TO S-20P	35		6	192	765.17	4	0.037	
X	S-20P TO S-19PS	35		6	192	765.17	4	0.037	
		70	275					0.074	0.884
	S-16S TO S-17PS	85		1	32	127.53	2	0.080	
	S-17PS TO S-19PS	60		2	64	255.06	2	0.226	
X	S-19PS TO S-18P	35		9	288	1147.75	4	0.083	
X	S-18P TO S-13PS	35		9	288	1147.75	4	0.083	
		70	345					0.167	1.051
	S-14S TO S-15PS	85		1	32	127.53	2	0.080	
	S-15PS TO S-13PS	65		2	64	255.06	2	0.245	
	S-12S TO S-13PS	65		1	32	127.53	2	0.061	
X	S-13PS TO S-11P	40		12	384	1530.33	4	0.170	
		40	385					0.170	1.221
	S-10PS TO S-11P	45		1	32	127.53	2	0.042	
		45							
X	S-11P TO S-8PS	45		13	416	1657.86	4	0.224	
		45	430					0.224	1.445
X	S-8PS TO JB	65		21	672	2678.08	6	0.111	
	TOTALS	65	495					0.111	1.556