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June 29, 2001

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RE: Contract No. N62467-98-D-0995  
Contract Task Order 0058 – Naval Air Station (NAS) Jacksonville, Jacksonville, FL  
Work Plan Addendum No. 05 Revision No. 01 for the Remedial Action at Operable Unit  
3, Areas C and D and PSC 16

Dear Mr. Gaskins:

CH2M HILL Constructors, Inc. is pleased to provide two copies of the enclosed Work Plan Addendum No. 05, Revision No. 01 with the Response to Comments for the Remedial Action at Operable Unit 3, Areas C and D and PSC 16, NAS Jacksonville, Jacksonville, Florida.

If you have any questions or comments regarding the enclosed, please do not hesitate to contact Michael Halil at (904) 777-4812 or at [mhalil@vnet.net](mailto:mhalil@vnet.net).

Sincerely,

CH2M HILL Constructors, Inc.

  
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CCI Project File No. 163144

**Work Plan Addendum No. 05  
Remedial Action at Operable Unit 3  
Areas C and D and Potential Source of  
Contamination 16**

**Naval Air Station Jacksonville  
Jacksonville, Florida**

**Revision No. 01**

**Contract No. N62467-98-D-0995  
Contract Task Order No. 0058**

Submitted to:

**U.S. Naval Facilities  
Engineering Command  
Southern Division**

Prepared by:



115 Perimeter Center Place, N.E.  
Suite 700  
Atlanta, GA 30346

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June 2001

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06/15/01  
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**Client Acceptance:**

[Signature]  
U.S. Navy Responsible Authority

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Date

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**Appendices**

- A Critical Path Method Project Schedule
- B Submittal Register
- C Testing Plan and Log
- D Project QC Manager Certificate of Completion of Quality Control Orientation
- E Project QC Manager Appointing Letter
- F Site Specific Health and Safety Plan

# Acronym List

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AALA	Association for Laboratory Accreditation
AASHTO	Association of State Highway and Transportation Officials
ACO	Administrative Contracting Officer
AFCEE	Air Force Center for Environmental Excellence
ARARs	applicable or relevant and appropriate requirements
bls	below land surface
CCI	CH2M HILL Constructors, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CompQAP	Comprehensive Quality Assurance Plan
CTO	Contract Task Order
CO	Contracting Officer
COTR	Contracting Officer's Technical Representative
CPM	Critical Path Method
DCE	dichloroethene
DO	dissolved oxygen
DPT	direct-push technology
EISOPQAM	Environmental Investigations Standard Operation Procedures and Quality Assurance Manual
FDEP	Florida Department of Environmental Protection
GCTL	groundwater cleanup target level
HLA	Harding Lawson Associates
HRC	Hydrogen Release Compound
J.A. Jones	J.A. Jones Environmental Services Company
JP	jet propellant
lbs	pounds
LDR	Land Disposal Restriction
MSDS	Material Safety Data Sheets
µg/L	micrograms per liter
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NAVLAC	National Voluntary Laboratory Accreditation Program
NRC	National Response Center
NTR	Navy Technical Representative
ORP	oxidation-reduction potential
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCE	tetrachloroethene
PID	photoionization detector
POTW	publicly-owned treatment facility
PPE	Personal protective equipment
ppm	parts per million
PSC	Potential Source of Contamination

## Acronyms (Cont.)

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PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SOPs	standard operating procedures
PCE	Tetrachloroethene
T&D	Transportation and Disposal
TCE	trichloroethene
TSD	treatment, storage, or disposal
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

# 1.0 Introduction

---

CH2M HILL Constructors, Inc. (CCI) with J.A. Jones Environmental Services Company (J.A. Jones) have been contracted by the Department of the Navy, Southern Division Naval Facilities Engineering Command (NAVFAC), to prepare this Work Plan Addendum, under the Response Action Contract No. N62467-98-D-0995, Contract Task Order (CTO) No. 0058. The purpose of this Work Plan Addendum No. 05 is to outline the procedures to be used to perform remedial actions at Operable Unit (OU) 3, Areas C and D and Potential Source of Contamination (PSC) 16 located at Naval Air Station (NAS) Jacksonville, Jacksonville, Florida.

The scope of work under this CTO is to design and implement remedial action strategies at OU 3, Areas C and D and PSC 16 located at NAS Jacksonville, Jacksonville, Florida.

The selected remedial action strategy to remediate trichloroethene (TCE) contaminated groundwater at Areas C and D utilizes Hydrogen Release Compound (HRC) to enhance in-situ biodegradation rates for the chlorinated hydrocarbons (i.e., TCE) by supporting the reductive dechlorination processes. HRC is a proprietary polylactate ester that, upon being deposited into the subsurface, slowly releases lactate. Lactate is metabolized by naturally occurring microorganisms, resulting in the creation of anaerobic aquifer conditions and the production of hydrogen. Naturally occurring microorganisms capable of reductive dechlorination then use the hydrogen to progressively remove chlorine atoms from chlorinated hydrogen contaminants (i.e., convert tetrachloroethene [PCE] to TCE to dichloroethene [DCE] to vinyl chloride to ethane).

The selected remedial action strategy to remediate the polynuclear aromatic hydrocarbon (PAH) and lead contaminated sediment at PSC 16 is to utilize a raking device to selectively remove tar balls, which contain contaminants that are contributing to aquatic receptor toxicity, from the top 6 inches of sediment.

This Work Plan Addendum is organized into sections of text and appendices as follows.

**Section 1.0 Introduction** includes the site histories and project objectives.

**Section 2.0 Project Execution Plan** details the required scope of work, the project schedule, the communications plan, and the traffic control plan. A detailed project schedule is provided in Appendix A of this Work Plan Addendum. The NAS Jacksonville Basewide Work Plan provides a brief description of the reporting requirements under this contract.

**Section 3.0 Sampling and Analysis Plan (SAP)** provides project sample locations, sample collection frequency, and the required laboratory analyses for samples collected during project activities. The NAS Jacksonville Basewide Work Plan and Florida Department of Environmental Protection (FDEP) Standard Operating Procedures (SOPs) outline the sample collection methodology including sample handling, labeling, and required collection of quality assurance (QA) and quality control (QC) samples.

**Section 4.0 Waste Management Plan** discusses the characterization, disposal, onsite management, and transportation of wastes (i.e., well development water,

decontamination water, removed tar balls, etc.) encountered or generated during project activities.

**Section 5.0 Environmental Protection Plan** references the NAS Jacksonville Basewide Work Plan, which contains the Environmental Protection Plan for all work completed at NAS Jacksonville.

**Section 6.0 Quality Control Plan** includes the testing requirements for work described in this Work Plan Addendum. The site-specific project organization for this CTO is also included in this section. The submittal register and testing plan and log) are provided in Appendices B and C, respectively. The Certificate of Completion of Quality Control Orientation and the appointing letter for the Project QC Manager are provided in Appendices D and E, respectively. All other QC information is contained in the NAS Jacksonville Basewide Work Plan, including information on the quality administrators, the project organization for the work to be completed at NAS Jacksonville, and the definable features of work for each project site.

The site-specific health and safety plan that addresses the work described in this Work Plan Addendum is included in Appendix F. **Section 5.0 Site Health and Safety Plan** of the NAS Jacksonville Basewide Work Plan addresses project-specific health and safety issues for the remedial activities to be completed at NAS Jacksonville.

## 1.1 Site History

NAS Jacksonville is located in Duval County, Florida, on the western bank of the St. Johns River. OU 3 is located in the eastern part of the installation adjacent to the St. Johns River. The official mission of NAS Jacksonville is to provide facilities, service, and managerial support for the operation and maintenance of naval weapons and aircraft to operating forces of the United States Navy. Some of the tasks required to accomplish this mission include operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for turbojet engines, and support of special weapons systems.

Operations at OU 3 consist of primarily the activities associated with the Naval Aviation Depot (NADEP), which is the largest tenant command at NAS Jacksonville. NADEP's primary mission has been to perform in-depth rework, repair, and modification of aircraft engines, and aeronautical components. In addition to aircraft-related operation, NADEP also provides maintenance for various ground operating equipment. In addition to NADEP, OU 3 contains the helicopter flightline and the associated hangar areas plus various industrial, shop, and office buildings.

### 1.1.1 Areas C and D

Area C, between Hangars 122 and 123, and Area D, west end of Jetline Hangar, were discovered as areas of elevated groundwater contamination during a 1993 field program. No evidence to date identifies the sources of the groundwater contamination at Areas C and D. Additional sampling and analysis conducted from 1993 to 1998 at Area C yielded the following groundwater contaminant plume properties:

- Predominant contaminants present with maximum detected concentrations: TCE at 5,000 micrograms per liter ( $\mu\text{g}/\text{L}$ ) and methylene chloride at 27  $\mu\text{g}/\text{L}$

- Estimated total area: 29,400 square feet
- Estimated plume thickness: 10 feet
- Estimated upper boundary: 30 feet below land surface (bls)
- Estimated lower boundary: 40 feet bls

The Area C groundwater contaminant plume with contaminant concentrations based on the previous site investigations is shown on Figure 1-1. The total chlorinated solvent groundwater contaminant contours shown on Figure 1-1 were determined in the Remedial Investigation and Feasibility Study (RI/FS) (Harding Lawson Associates [HLA], 2000) conducted from 1993 to 1998.

Additional sampling and analysis conducted from 1993 to 1998 at Area D yielded the following groundwater contaminant plume properties:

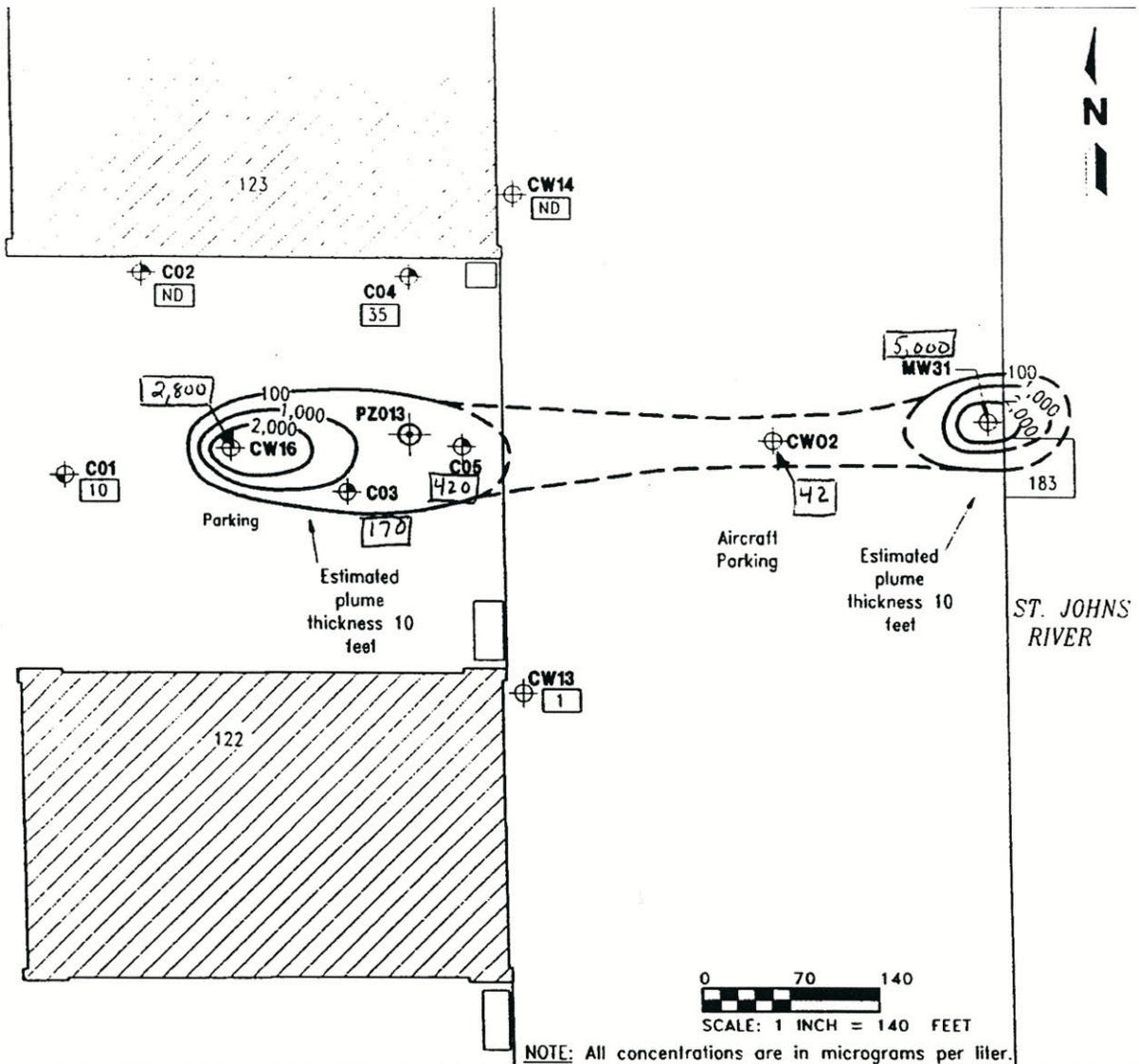
- Predominant contaminants present with maximum detected concentrations: TCE at 6,800 µg/L; 1,2-DCE at 190 µg/L; PCE at 34 µg/L; methylene chloride at 11.25 µg/L; manganese at 662 µg/L; and arsenic at 23 µg/L
- Estimated total area: 134,050 square feet
- Estimated plume thickness: 25 feet
- Estimated upper boundary: 27 feet bls
- Estimated lower boundary: 52 feet bls

The Area D groundwater contaminant plume with contaminant concentrations based on the previous site investigations is shown on Figure 1-2. The total chlorinated solvent groundwater contaminant contours shown on Figure 1-2 were determined in the RI/FS (HLA, 2000) conducted from 1993 to 1998.

### **1.1.2 PSC 16**

PSC 16 encompasses the outfall of the storm water sewer that drains the southern half of NADEP. PSC 16 is south of and adjacent to OU 3. The Black Point storm sewer discharge to the St. Johns River was identified as a PSC based on the recurring discharges of jet propellant 5 (JP-5) fuel and oil that reportedly entered the storm sewer from a fuel tank overflow in the vicinity of test cell 12, located along the east side of Building 101. A spill log from the NAS Jacksonville Facilities Department documented many spills at the Black Point Outfall, including spills of JP-5 fuel, hydraulic oil, chrome, and cyanide. In addition, oil and various chemical waste from other sources within the southern half of NADEP were reportedly discharged into the storm sewer. Because the possible discharge of toxic materials into the St. Johns River posed a potential threat to human health and aquatic life, PSC 16 was recommended for additional investigation.

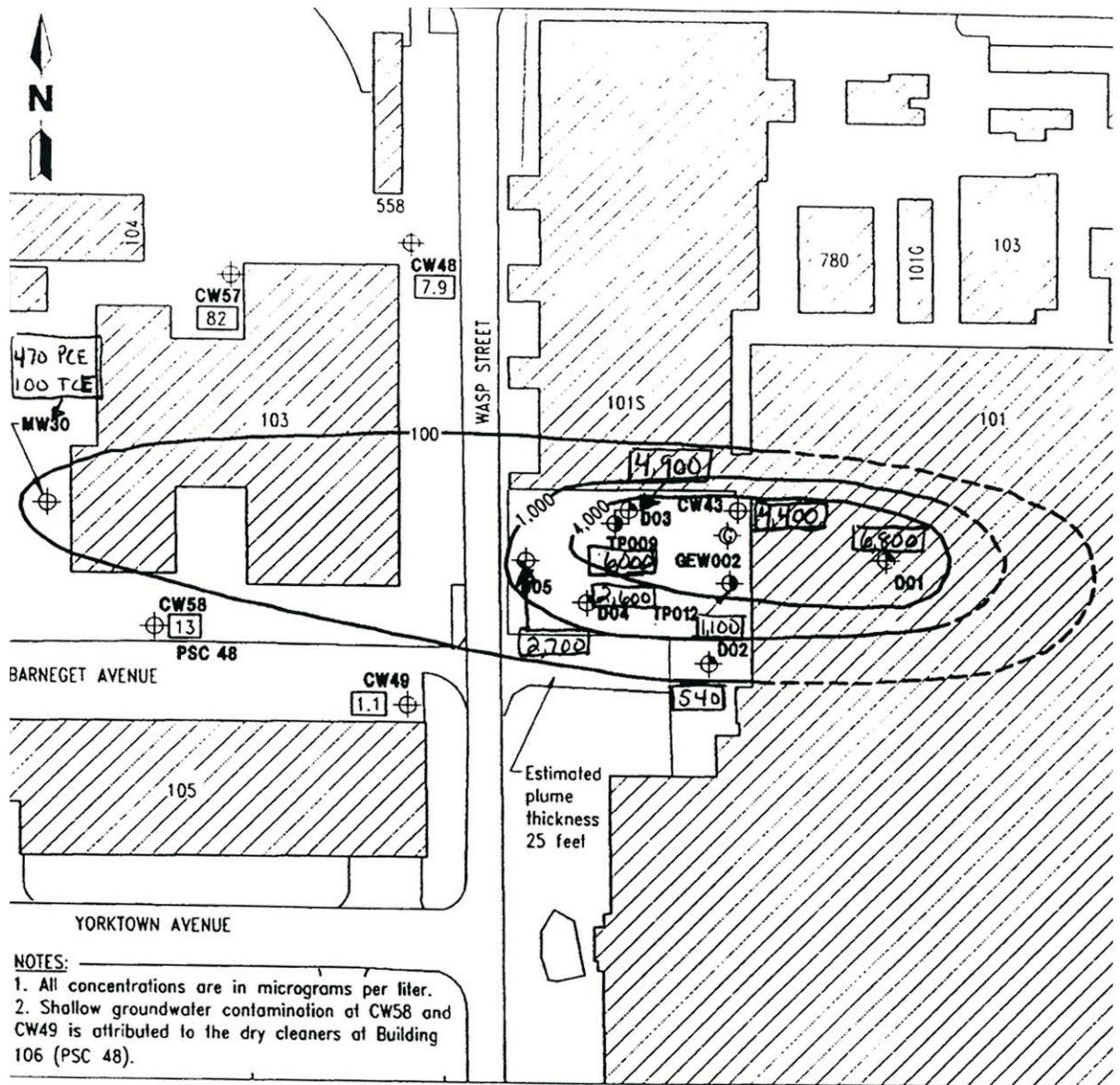
Additional sediment investigation at the PSC 16 Black Point Outfall showed an elevated PAH concentration (8,660 parts per billion) and lead concentration (139 parts per million [ppm]), and a 0 percent survival rate in sediment toxicity testing. Tar balls were detected at the above sediment sample location, as well as two other locations at the



- LEGEND**
- CW16** Cone penetrometer test sample location and designation (conducted during the SSFP in 1993)
  - C04** Hydrocone sample location and designation
  - SSFP** Scoping study field program
  - Building
  - C01** Piezocone and hydrocone location and designation
  - PZ013** Piezometer location and designation (installed during the SSFP in 1993)
  - 100 Total chlorinated solvent contour in groundwater (dashed where inferred)
  - 35 Total chlorinated solvent concentration in intermediate zone of the surficial aquifer
  - ND** Not detected

Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 1-1**  
 Area C  
 Site Plan  
 NAS Jacksonville  
 Jacksonville, Florida



<b>LEGEND</b>	<b>D05</b>	Piezicone and hydrocone location and designation	<b>SSFP</b>	Scoping study field program
<b>CW58</b>				Total chlorinated solvent concentration in intermediate zone of the shallow aquifer
		Total chlorinated solvent contour in groundwater (dashed where inferred)		Building
<b>D02</b>		Hydrocone sample location and designation		0 70 140
<b>GEW002</b>		Groundwater extraction well location and designation	SCALE: 1 INCH = 140 FEET	
<b>TP009</b>		Temporary piezometer installed for groundwater pumping test in 1996		
<b>PSC</b>		Potential source of contamination		

Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 1-2**  
 Area D  
 Site Plan  
 NAS Jacksonville  
 Jacksonville, Florida

outfall; these tar balls are believed to contain contaminants that are contributing to the aquatic receptor toxicity.

## 1.2 Project Objectives

The project objective at Areas C and D is to design and implement an HRC injection strategy to remediate the contaminated groundwater to the following FDEP groundwater cleanup target levels (GCTLs) or NAS Jacksonville Basewide Background Concentrations, as listed in Table 1-1.

**TABLE 1-1**  
FDEP GCTLs and NAS Jacksonville Basewide Background Concentrations

Analyte	FDEP GCTL (µg/L)	NAS Jacksonville Basewide Background Concentration (µg/L)
1,2-DCE	70	NA <sup>1</sup>
Arsenic <sup>2</sup>	50	13.2
Manganese <sup>3</sup>	50	204
Methylene Chloride	5	NA
PCE	3	NA
TCE	3	NA

<sup>1</sup> NA denotes Not Applicable

<sup>2</sup> Arsenic was detected above the NAS Jacksonville Basewide Background Concentration, but not above the GCTL; however, the established site risk-based cleanup level is 17 µg/L.

<sup>3</sup> The higher of the GCTL and NAS Jacksonville Basewide Background Concentration applies as the cleanup level.

The project objective at PSC 16 is to selectively remove all tar balls identified by visual inspection from the top 6 inches of sediment at the site using a raking device, and then to show a reduced aquatic receptor toxicity by post-tar ball removal sediment sampling and analysis.

CCI/J.A. Jones utilized the following documents in preparation of this Work Plan Addendum:

- ABB Environmental Services, Inc., March 1998; Engineering Evaluation of Areas with Elevated Groundwater Contamination, Operable Unit 3, Naval Air Station Jacksonville, Jacksonville, Florida.
- Harding Lawson Associates, April 2000; Remedial Investigation and Feasibility Study, Operable Unit 3, Volumes I-III; Naval Air Station, Jacksonville, Florida.
- Harding Lawson Associates, September 2000; Record of Decision; Potential Sources of Contamination 11, 12, 13, 14, 15, 16, and 48, Building 780, and Other Areas of Elevated Groundwater Contamination; Operable Unit 3; Naval Air Station Jacksonville, Jacksonville, Florida.

## 2.0 Project Execution Plan

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The scope of work, project schedule, communications plan and traffic control plan are described in this section.

### 2.1 Scope of Work

The scope of work for this project includes the following activities:

- Area C
  - Mobilization and setup of temporary facilities and site controls
  - Plume delineation sampling and analysis event
  - Monitoring well installation
  - Baseline groundwater sampling and analyses
  - HRC Injection
  - Groundwater monitoring program
  - Site restoration
  - Decontamination
  - Demobilization
- Area D
  - Mobilization and setup of temporary facilities and site controls
  - Plume delineation sampling and analysis event
  - Monitoring well installation
  - Baseline groundwater sampling and analyses
  - HRC Injection
  - Groundwater monitoring program
  - Site restoration
  - Decontamination
  - Demobilization
- PSC 16
  - Mobilization and setup of temporary facilities and site controls
  - Tar ball removal
  - Post-tar ball removal sediment sampling event
  - Site restoration
  - Decontamination
  - Demobilization

#### 2.1.1 Mobilization and Setup of Temporary Facilities and Site Controls

This task will consist of personnel and equipment mobilizing to the work site and establishing temporary facilities consisting of portable sanitary facilities, a decontamination area, site refuge area, and equipment laydown area. Project management and scheduling activities, including contractor coordination, will be

achieved from the CCI/J.A. Jones office trailer equipped with telephone and facsimile capabilities located at NAS Jacksonville. Office supplies, field equipment, and personal protective equipment (PPE) will be stored in the office.

Prior to the commencement of work at each site, site controls including construction barricades will be installed and the decontamination area, site refuge area, and equipment laydown area will be prepared. If necessary, security fencing will also be installed. CCI/J.A. Jones will coordinate with both the NAS Jacksonville Public Works Center and the Resident Officer in Charge of Construction (ROICC) to acquire utility layout plans of each area. Utilities in the work areas will be marked with paint and stakes, as appropriate. All marked utility lines in construction areas will be uncovered with hand tools. In addition, the progress of subsurface work will be continuously monitored for evidence of obstructions.

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

## **2.1.2 Area C**

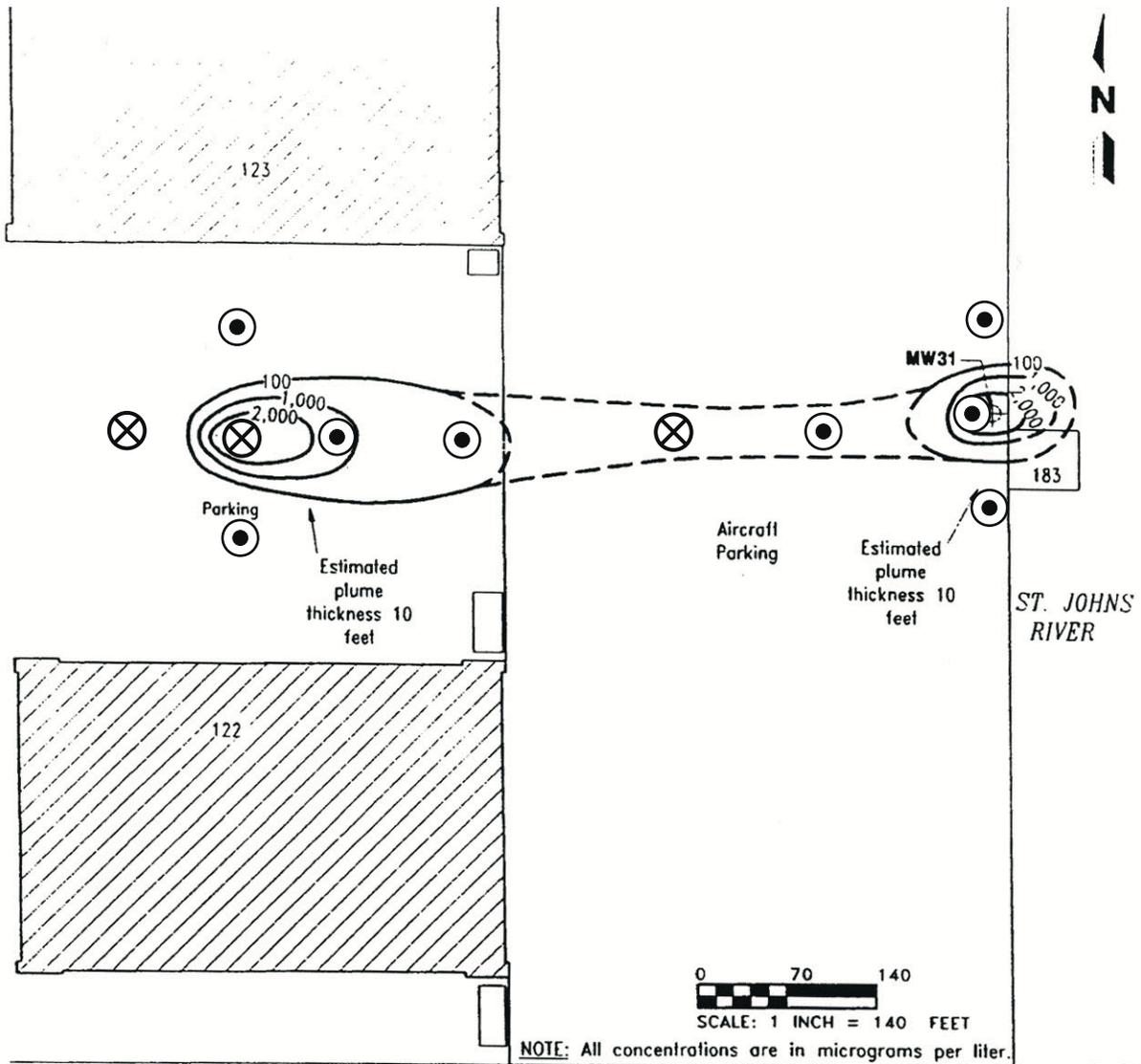
### **2.1.2.1 Plume Delineation Sampling and Analysis Event**

The initial step for the design and implementation of the HRC injection strategy at Area C will be to collect new analytical data to verify and update the analytical data collected during the previous site investigations. This will be completed using a direct-push technology (DPT) or Geoprobe rig and an onsite mobile laboratory. DPT borings will be initially completed at the locations shown on Figure 2-1. The initial DPT borings are based on the total chlorinated solvent groundwater contaminant contours determined in the RI/FS (HLA, 2000). If these sample locations do not provide adequate groundwater analytical data to determine the size and shape of the groundwater plume, additional sampling locations will be necessary. Groundwater samples will be collected using the Geoprobe rig and peristaltic sampling pump and analyzed by the onsite mobile laboratory for U.S. Environmental Protection Agency (USEPA) SW-846 Method 8260B in accordance with Section 3.0 Sampling and Analysis Plan.

The initial groundwater samples will be collected from the suspected source area locations adjacent to CW-16 and existing monitoring well MW-31 at intervals of 22 to 26 feet bls (or directly above the clay layer), 26 to 30 feet bls, 30 to 34 feet bls, 34 to 38 feet bls, 38 to 42 feet bls, and 42 to 46 feet bls to verify the vertical source interval(s) (the vertical interval(s) with the highest contaminant concentration). Groundwater samples will then be collected from the other sample locations at the vertical source interval(s) and the intervals directly above and below the vertical source interval(s). In addition, a groundwater sample will be collected from MW-31.

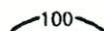
In addition to groundwater sample collection, a soil core sample will be collected from the source location at the vertical source interval using the Geoprobe rig, screened using a photoionization detector (PID), and analyzed by the onsite mobile laboratory for USEPA SW-846 Method 8260B in accordance with Section 3.0 Sampling and Analysis.

Following groundwater sample collection and analysis, each boring will be abandoned by sealing the boring with grout from the bottom of the boring to the ground surface using a tremie pipe.



**LEGEND**

-  Geoprobe Sampling Location
-  Geoprobe Sampling Location and Proposed Monitoring Well Installation Point
-  Building

 Total chlorinated solvent contour in groundwater (dashed where inferred)

Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 2-1**  
 Area C  
 Proposed Sampling Locations  
 NAS Jacksonville  
 Jacksonville, Florida

Each DPT groundwater and soil sample location will be surveyed by a surveyor registered in the State of Florida. All survey data will conform to the Tri-Service Spatial Data Standards. Horizontal controls are Mercator Projection, GRS 80, State Plane Coordinate System, North American Datum 1983.

### **2.1.2.2 Monitoring Well Installation**

Prior to monitoring well installation, the results of the plume delineation sampling and analysis event will be reviewed with the NAS Jacksonville Partnering Team (Team), and the Team will determine the actual number, placement, and construction details of the monitoring wells.

It is anticipated four monitoring wells will be installed following the plume delineation event to collect baseline groundwater analytical data, natural attenuation parameters for the final HRC injection design, and to perform the groundwater monitoring program to monitor the progress of the HRC injection. Only three monitoring wells will require installation if existing monitoring well MW-31 is installed at the proper depth interval. The anticipated locations for monitoring well installation are shown on Figure 2-1. The anticipated monitoring well locations are based on the total chlorinated solvent groundwater contaminant contours determined in the RI/FS (HLA, 2000). It is anticipated the monitoring wells will be placed at each source location (CW-16 and MW-31 if MW-31 cannot be used because it is not screened at the correct interval), and up- and down-gradient from the CW-16 location. Each monitoring well will be installed by DPT and will be constructed of 1.25-inch outside diameter, pre-packed, 0.10-inch slot width, Schedule 40 polyvinyl chloride (PVC) well screen with a 0.5-inch diameter Schedule 40 PVC riser. The filter pack will consist of 20/40-grade silica sand. Each well will have a 5-foot screen and will be screened across the vertical source interval. Existing monitoring well MW-31 will be evaluated for abandonment if the well cannot be utilized in the groundwater monitoring program.

All monitoring wells will be installed and developed by a Florida-registered/certified well driller. Each monitoring well will be flush-mounted with a protective bolt-down manhole cover capable of supporting aircraft traffic and a concrete pad constructed of similar strength concrete of the surrounding area. Each well will have a nameplate with the well name, total depth of well, screen interval, date of installation, and well driller name.

Each monitoring well will be developed until clear with the recovery of at least three well volumes of purge water. Any generated drill cuttings and the purge water removed during development activities will be containerized in 55-gallon drums; sampled in accordance with Section 3.0 Sampling and Analysis Plan; and managed, transported, and disposed in accordance with Section 4.0 Waste Management Plan.

Each installed monitoring well location and top-of-casing elevation will be surveyed by a surveyor registered in the State of Florida. All survey data will conform to the Tri-Service Spatial Data Standards. Horizontal controls are Mercator Projection, GRS 80, State Plane Coordinate System, North American Datum 1983. Vertical controls are Mean Sea Level, North American Vertical Datum, 1988.

### **2.1.2.3 Baseline Groundwater Sampling and Analyses**

Following monitoring well installation, the baseline groundwater sampling and analysis event will be performed on the installed monitoring wells and existing monitoring well MW-31 in accordance with Section 3.0 Sampling and Analysis Plan. The groundwater parameters collected will include:

- USEPA SW-846 Method 8260B
- Field Parameters: dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, temperature, and ferrous iron
- Natural attenuation/inorganic parameters: dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, and alkalinity
- HRC-based electron donor: total organic carbon and metabolic acids
- End-product dissolved gases: carbon dioxide, methane, ethane, and ethene

This baseline data will be utilized with the plume delineation groundwater analytical data to design the final HRC injection strategy.

### **2.1.2.4 HRC Injection**

The initial HRC injection will be completed following the development of a final HRC injection strategy agreed upon by the Team. HRC injection will be completed at each injection location by DPT and Geoprobe GS-2000 pump.

The preliminary HRC injection strategy based on analytical data collected and provided in the RI/FS (HLA, 2000) is as follows (Note: This is a preliminary HRC injection design only and is subject to be refined/modified depending on the results from the plume delineation and baseline sampling and analysis events):

- Zone 1 (CW-16 area)
  - Treatment area: 210 feet by 70 feet
  - Delivery point spacing and configuration: 21 rows of 7 points (147 total points); 10-foot on center between rows, 10-foot on center within rows
  - HRC dose rate: 6 pounds (lbs) per foot (60 lbs per point)
  - HRC material requirement: 8,820 lbs
- Zone 2 (MW-31 area)
  - Treatment area: 70 feet by 70 feet
  - Delivery point spacing and configuration: 7 rows of 7 points (49 total points); 10-foot on center between rows, 10-foot on center within rows
  - HRC dose rate: 6 lbs per foot (60 lbs per point)
  - HRC material requirement: 2,940 lbs
- HRC Barrier Treatment after 1 year (20 feet west of seawall)
  - Treatment area: 70 foot long barrier

- Delivery point spacing and configuration: 2 rows of 7 points (14 total points); 10-foot on center between rows, 10-foot on center within rows
- HRC dose rate: 6 lbs per foot (60 lbs per point)
- HRC material requirement: 840 lbs

This preliminary HRC injection design assumes the initial injection will include a full HRC grid injection in Zones 1 and 2 followed by a HRC barrier treatment one year following the initial HRC grid injection. Figure 2-2 shows the proposed locations for the preliminary HRC injection design.

Following HRC injection, each boring will be abandoned by sealing the boring with grout from the bottom of the boring to the ground surface using a tremie pipe.

### **2.1.2.5 Groundwater Monitoring Program**

Following the initial HRC injection, the quarterly groundwater monitoring program will be implemented on the installed monitoring wells and existing monitoring well MW-31 (if applicable) in accordance with Section 3.0 Sampling and Analysis Plan. The groundwater parameters collected will include:

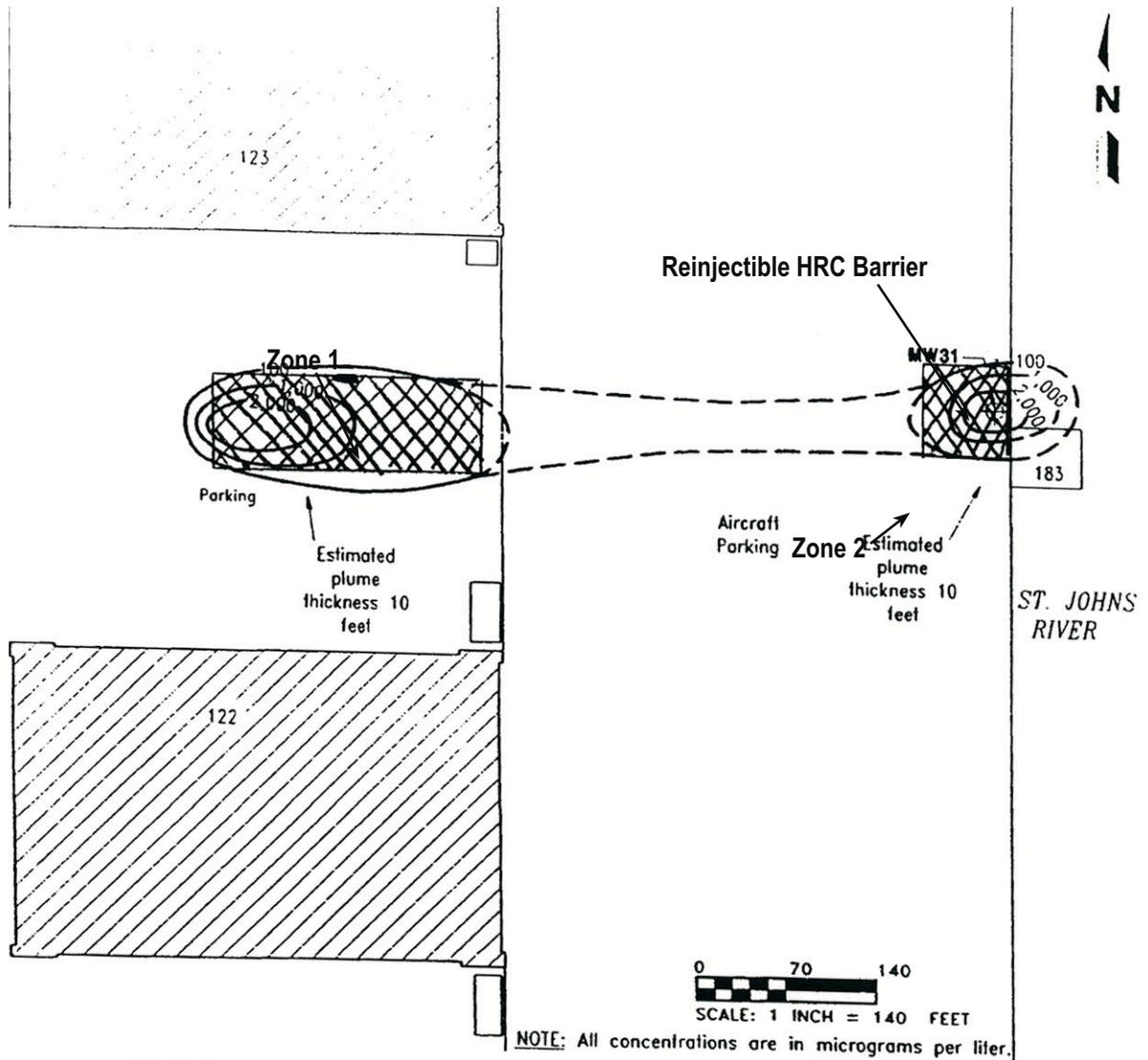
- USEPA SW-846 Method 8260B
- Field parameters: DO, ORP, pH, temperature, and ferrous iron
- Natural attenuation/inorganic parameters: dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, and alkalinity
- HRC-based electron donor: total organic carbon and metabolic acids
- End-product dissolved gases: carbon dioxide, methane, ethane, and ethene

The quarterly groundwater monitoring program will be used to determine the effectiveness of the HRC injection and to evaluate the necessity and timing of future HRC re-injections.

## **2.1.3 Area D**

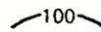
### **2.1.3.1 Plume Delineation Sampling and Analysis Event**

The initial step for the design and implementation of the HRC injection strategy at Area D will be to collect new analytical data to verify and update the analytical data collected during the previous site investigations. This will be completed using a DPT or Geoprobe rig and an onsite mobile laboratory. DPT borings will be initially completed at the locations shown on Figure 2-3. The initial DPT borings are based on the total chlorinated solvent groundwater contaminant contours determined in the RI/FS (HLA, 2000). If these sample locations do not provide adequate groundwater analytical data to determine the size and shape of the groundwater plume, additional sampling locations will be necessary. Groundwater samples will be collected using the Geoprobe rig and peristaltic sampling pump and analyzed by the on site mobile laboratory for USEPA SW-846 Method 8260B in accordance with Section 3.0 Sampling and Analysis Plan.



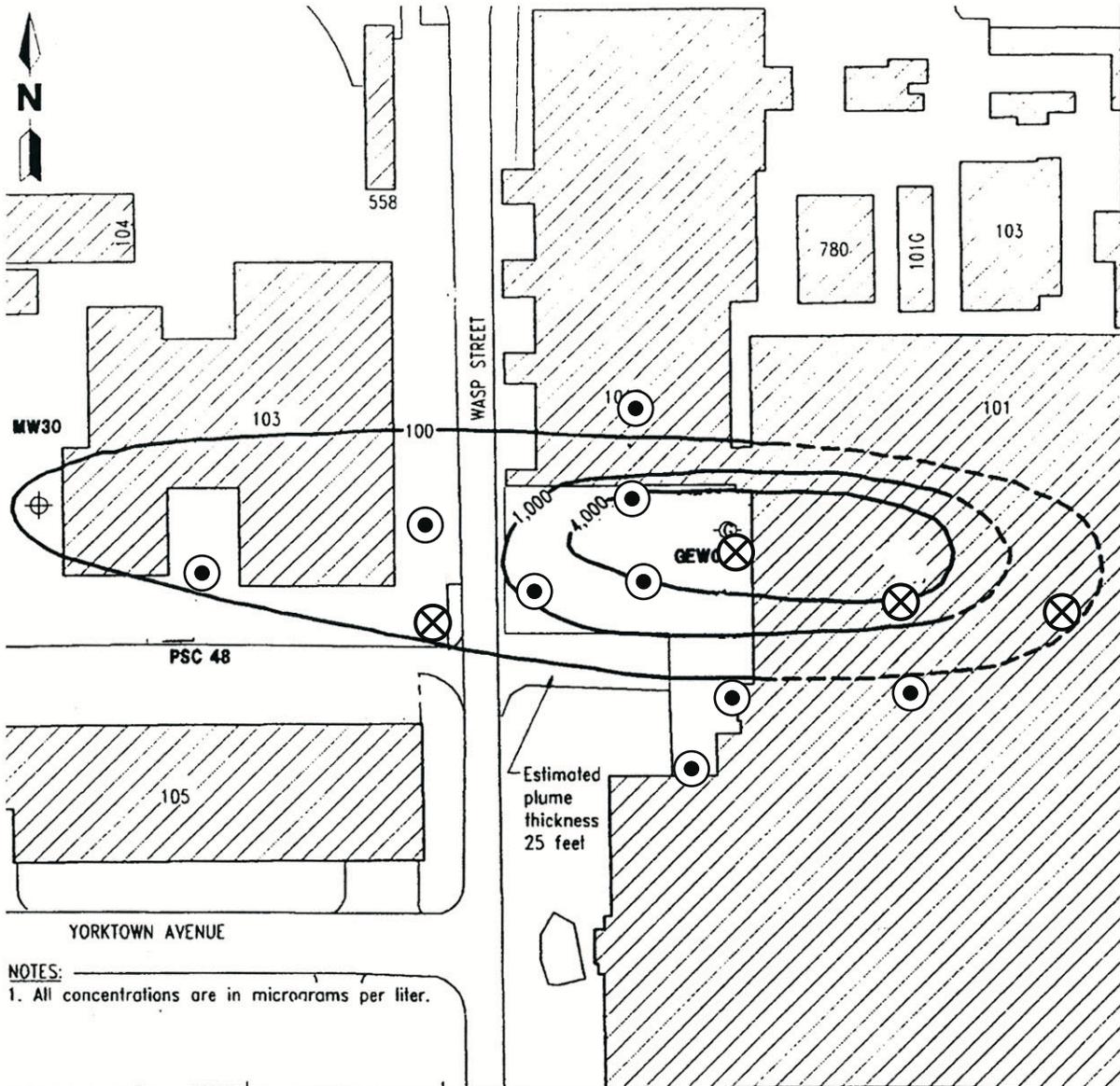
**LEGEND**

 HRC Injection Arrays  
 Building

 100 Total chlorinated solvent contour in groundwater (dashed where inferred)

Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

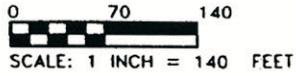
**Figure 2-2**  
 Area C  
 Proposed HRC Injection Locations  
 NAS Jacksonville  
 Jacksonville, Florida



**NOTES:**  
 1. All concentrations are in micrograms per liter.

**LEGEND**

- Geoprobe Sampling Location
- Geoprobe Sampling Location and Proposed Monitoring Well location and designation
- Groundwater extraction well installation point
- PSC Potential source of contamination
- Total chlorinated solvent contour in groundwater (dashed where inferred)
- Building



Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 2-3**  
 Area D  
 Proposed Sampling Locations  
 NAS Jacksonville  
 Jacksonville, Florida

The initial groundwater samples will be collected from the source area locations adjacent to CW-43 and D01 at intervals of 23 to 27 feet bls (or directly above the clay layer), 27 to 31 feet bls, 31 to 35 feet bls, 35 to 39 feet bls, 39 to 43 feet bls, 43 to 47 feet bls, 47 to 51 feet bls, and 51 to 55 to verify the vertical source interval(s) (the vertical interval(s) with the highest contaminant concentration). Groundwater samples will then be collected from the other sample locations at the vertical source interval(s) and the intervals directly above and below the vertical source interval(s). In addition, groundwater samples will be collected from existing pump test well GEW002 and existing monitoring well MW-30.

In addition to groundwater sample collection, a soil core sample will be collected from the source location at the vertical source interval using the Geoprobe rig, screened using a PID, and analyzed by the on site mobile laboratory for USEPA SW-846 Method 8260B in accordance with Section 3.0 Sampling and Analysis Plan.

Each DPT groundwater and soil sample location will be surveyed by a surveyor registered in the State of Florida. All survey data will conform to the Tri-Service Spatial Data Standards. Horizontal controls are Mercator Projection, GRS 80, State Plane Coordinate System, North American Datum 1983.

Following groundwater sample collection and analysis, each boring will be abandoned by sealing the boring with grout from the bottom of the boring to the ground surface using a tremie pipe.

### **2.1.3.2 Monitoring Well Installation**

Prior to monitoring well installation, the results of the plume delineation sampling and analysis event will be reviewed with the Team, and the Team will determine the actual number, placement, and construction details of the monitoring wells.

It is anticipated four monitoring wells will be installed following the plume delineation event to collect baseline groundwater analytical data, natural attenuation parameters for the final HRC injection design, and to perform the groundwater monitoring program to monitor the progress of the HRC injection. The anticipated locations for monitoring well installation are shown on Figure 2-3. The anticipated monitoring well locations are based on the total chlorinated solvent groundwater contaminant contours determined in the RI/FS (HLA, 2000). It is anticipated the monitoring wells will be placed at each source location (CW-43 and D01), and up-gradient of D01 and down-gradient from CW-43. Each monitoring well will be installed by DPT and will be constructed of 1.25-inch outside diameter, pre-packed, 0.10-inch slot width, Schedule 40 PVC well screen with a 0.5-inch-diameter Schedule 40 PVC riser. The filter pack will consist of 20/40-grade silica sand. Each well will have a 5-foot screen and will be screened across the vertical source interval.

All monitoring wells will be installed and developed by a Florida-registered/certified well driller. In areas rated for aircraft traffic, each monitoring well will be flush-mounted with a protective bolt-down manhole cover capable of supporting aircraft traffic and a concrete pad constructed of similar strength concrete of the surrounding area. In areas rated for vehicular traffic, each monitoring well will be flush-mounted with a protective bolt-down manhole cover capable of supporting vehicular traffic and a

concrete pad. Each well will have a nameplate with the well name, total depth of well, screen interval, date of installation, and well driller name.

Each monitoring well will be developed until clear with the recovery of at least three well volumes of purge water. Any generated drill cuttings and the purge water removed during development activities will be containerized in 55-gallon drums; sampled in accordance with Section 3.0 Sampling and Analysis; and managed, transported, and disposed in accordance with Section 4.0 Waste Management Plan.

Each installed monitoring well location and top-of-casing elevation will be surveyed by a surveyor registered in the State of Florida. All survey data will conform to the Tri-Service Spatial Data Standards. Horizontal controls are Mercator Projection, GRS 80, State Plane Coordinate System, North American Datum 1983. Vertical controls are Mean Sea Level, North American Vertical Datum, 1988.

### **2.1.3.3 Baseline Groundwater Sampling and Analyses**

Following monitoring well installation, the baseline groundwater sampling and analysis event will be performed on the installed monitoring wells, GEW002, and MW-30 in accordance with Section 3.0 Sampling and Analysis Plan. The groundwater parameters collected will include:

- USEPA SW-846 Method 8260B
- USEPA SW-846 Method 6010B/7470A
- Field parameters: DO, ORP, pH, temperature, and ferrous iron
- Natural attenuation/inorganic parameters: dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, and alkalinity
- HRC-based electron donor: total organic carbon and metabolic acids
- End-product dissolved gases: carbon dioxide, methane, ethane, and ethene

This baseline data will be utilized with the plume delineation groundwater analytical data to design the final HRC injection strategy.

### **2.1.3.4 HRC Injection**

The initial HRC injection will be completed following the development of a final HRC injection strategy agreed upon by the Team. HRC injection will be completed at each injection location by DPT and Geoprobe GS-2000 pump.

The preliminary HRC injection strategy based on analytical data collected and provided in the RI/FS (HLA, 2000) is as follows (Note: This is a preliminary HRC injection design only and is subject to be refined/modified depending on the results from the plume delineation and baseline sampling and analysis events):

- Zone 1 (CW-43 area)
  - Treatment area: 140 feet by 100 feet
  - Delivery point spacing and configuration: 14 rows of 10 points (140 total points); 10-foot on center between rows, 10-foot on center within rows

- HRC dose rate: 4 lbs per foot (100 lbs per point)
- HRC material requirement: 14,000 lbs
- Zone 2 (Up-gradient of Wasp Street)
  - Treatment area: 185 feet by 10 feet
  - Delivery point spacing and configuration: 2 rows of 19 points (38 total points); 10-foot on center between rows, 10-foot on center within rows
  - HRC dose rate: 3 lbs per foot (75 lbs per point)
  - HRC material requirement: 2,850 lbs
- Zone 3 (Up-gradient of Building 103)
  - Treatment area: 85 feet by 10 feet
  - Delivery point spacing and configuration: 1 row of 8 points, 1 row of 9 points (17 total points); 10-foot on center between rows, 10-foot on center within rows
  - HRC dose rate: 3 lbs per foot (75 lbs per point)
  - HRC material requirement: 1,275 lbs
- Zone 4 (Building 103 keyway):
  - Treatment area: 70 feet by 10 feet
  - Delivery point spacing and configuration: 2 rows of 7 points (14 total points); 10-foot on center between rows, 10-foot on center within rows
  - HRC dose rate: 3 lbs per foot (75 lbs per point)
  - HRC material requirement: 1,050 lbs

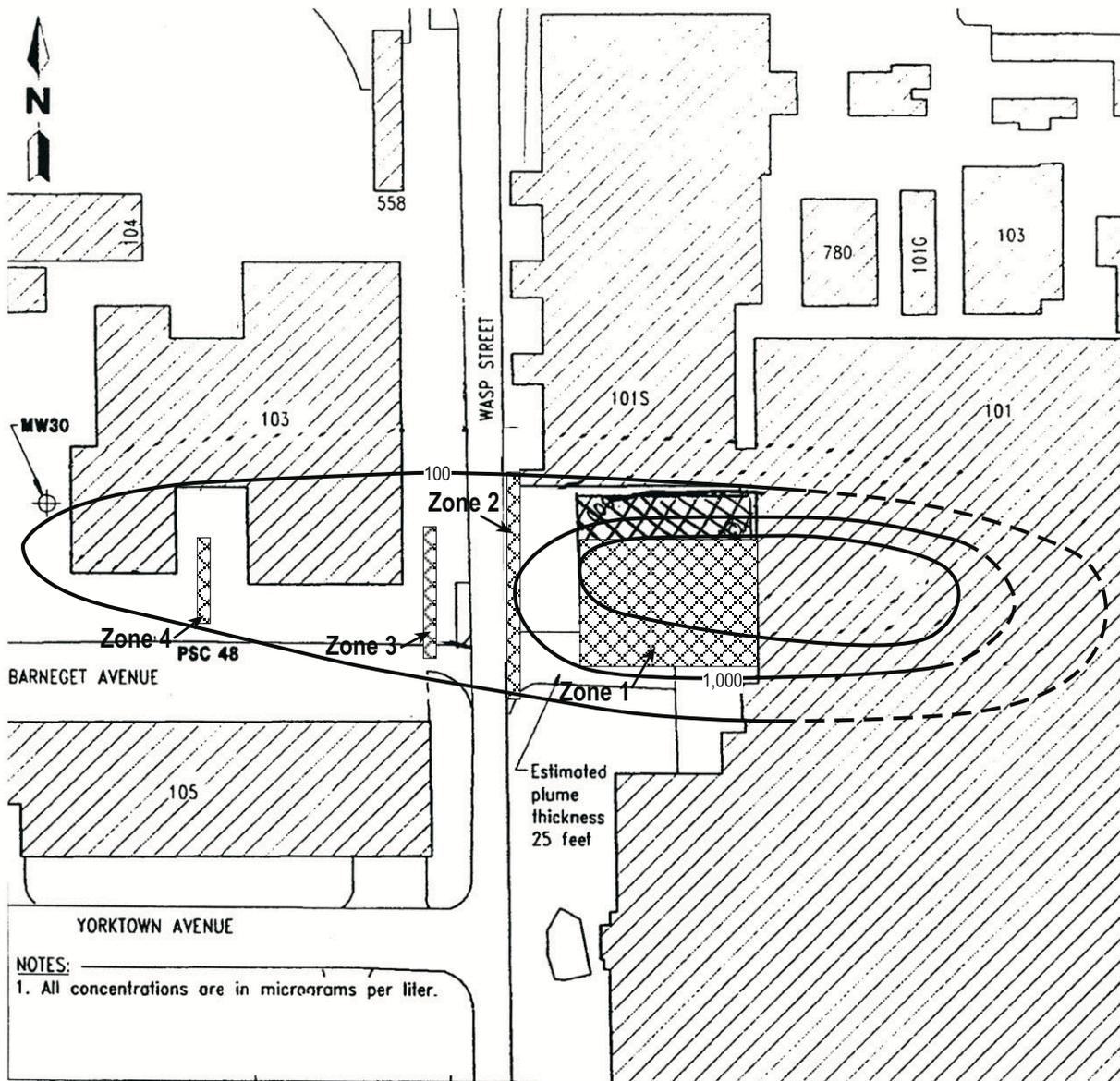
This preliminary HRC injection design assumes the initial injection will include a full HRC grid injection in Zones 1 through 4 followed by a HRC re-injection 1 year following the initial HRC injection consisting of an HRC injection with one-half of the injection points and one-fourth of the HRC materials in Zone 1 and a full HRC re-injection in Zones 2 through 4. Figure 2-4 shows the proposed locations for the preliminary HRC injection design.

Following HRC injection, each boring will be abandoned by sealing the boring with grout from the bottom of the boring to the ground surface using a tremie pipe.

### **2.1.3.5 Groundwater Monitoring Program**

Following the initial HRC injection, the quarterly groundwater monitoring program will be implemented on the installed monitoring wells, GEW002, and MW-30 in accordance with Section 3.0 Sampling and Analysis Plan. The groundwater parameters collected will include:

- USEPA SW-846 Method 8260B
- USEPA SW-846 Method 6010B/7470A
- Field parameters: DO, ORP, pH, temperature, and ferrous iron
- Natural attenuation/inorganic parameters: dissolved iron and manganese, nitrate, sulfate, sulfide, chloride, and alkalinity



**NOTES:**  
 1. All concentrations are in micrograms per liter.

**LEGEND**

-  HRC Injection Arrays
-  **GEW002** Groundwater extraction well location and designation
-  PSC Potential source of contamination
-  100 Total chlorinated solvent contour in groundwater (dashed where inferred)
-  Building
-  0 70 140  
SCALE: 1 INCH = 140 FEET

Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 2-4**  
 Area D  
 Proposed HRC Injection Location  
 NAS Jacksonville  
 Jacksonville, Florida

- HRC-based electron donor: total organic carbon and metabolic acids
- End-product dissolved gases: carbon dioxide, methane, ethane, and ethene

The quarterly groundwater monitoring program will be used to determine the effectiveness of the HRC injection and to evaluate the necessity and timing of future HRC re-injections.

## **2.1.4 PSC 16**

### **2.1.4.1 Pre-Tar Ball Removal Inspection**

The initial step will be to visually inspect the PSC 16 area for the presence of tar balls to verify/determine the actual area requiring tar ball removal. The proposed removal area as determined in the RI/FS (HLA, 2000) is shown on Figure 2-5.

### **2.1.4.2 Tar Ball Removal**

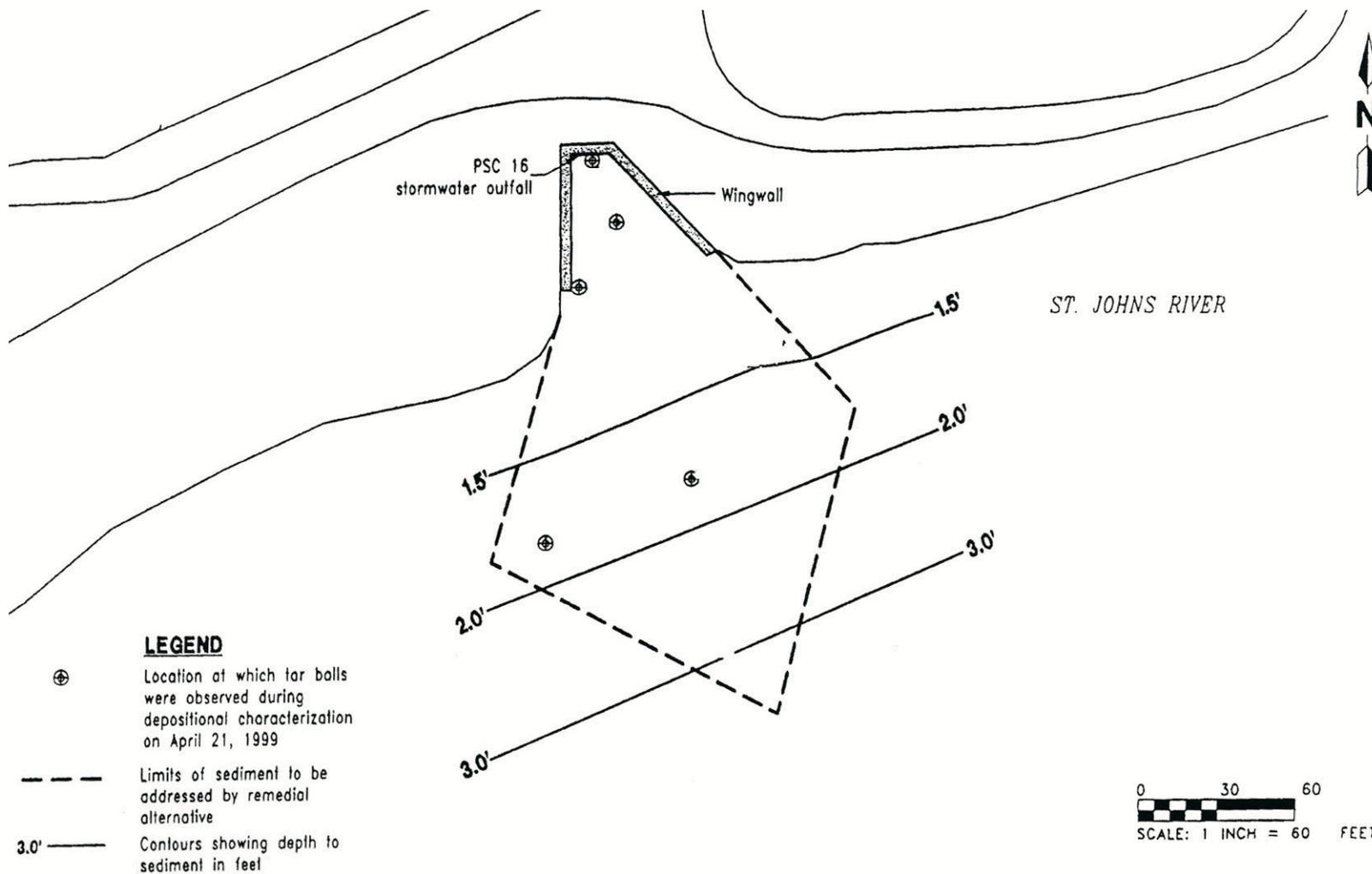
The selected remedy at PSC 16 is selective removal of the tar balls from the top 6 inches of sediment using a raking device. Initially, a silt containment fence will be set up around the work area perimeter to limit offsite sediment migration during the tar ball removal. The work area will then be separated into 10-foot by 10-foot grids using string lines. Each grid will then be repeatedly sifted through with a combination of rakes, metal nets, and shovels until satisfactory removal is achieved. Areas requiring tar ball removal in deeper water will be worked on during low tide to create an easier removal. The removed tar balls will be containerized in 55-gallon drums, sampled in accordance with Section 3.0 Sampling and Analysis Plan, and managed, transported, and disposed in accordance with Section 4.0 Waste Management Plan. Bivalve organisms collected during tar ball removal will be separated from the tar balls and returned to the St. Johns River.

### **2.1.4.3 Post-Tar Ball Removal Sediment Sampling Event**

Post-tar ball removal sediment sampling will be performed in accordance with Section 3.0 Sampling and Analysis Plan approximately 6 to 8 weeks following tar ball removal to show a reduced aquatic receptor toxicity in the sediment. Sediment samples will be collected from the top 6 inches of sediment at the five locations shown on Figure 2-6 and analyzed for PAHs by USEPA SW-846 Method 8310, lead, grain size, total organic carbon, and 10-day toxicity testing for *Leptochierus plumulosus*. Samples will be collected downstream towards the upstream direction across the site. The sediment sample locations shown on Figure 2-6 are based on the proposed tar ball removal area determined in the RI/FS (HLA, 2000). Each sediment sampling location will be assigned coordinates using a portable geographic positioning system unit.

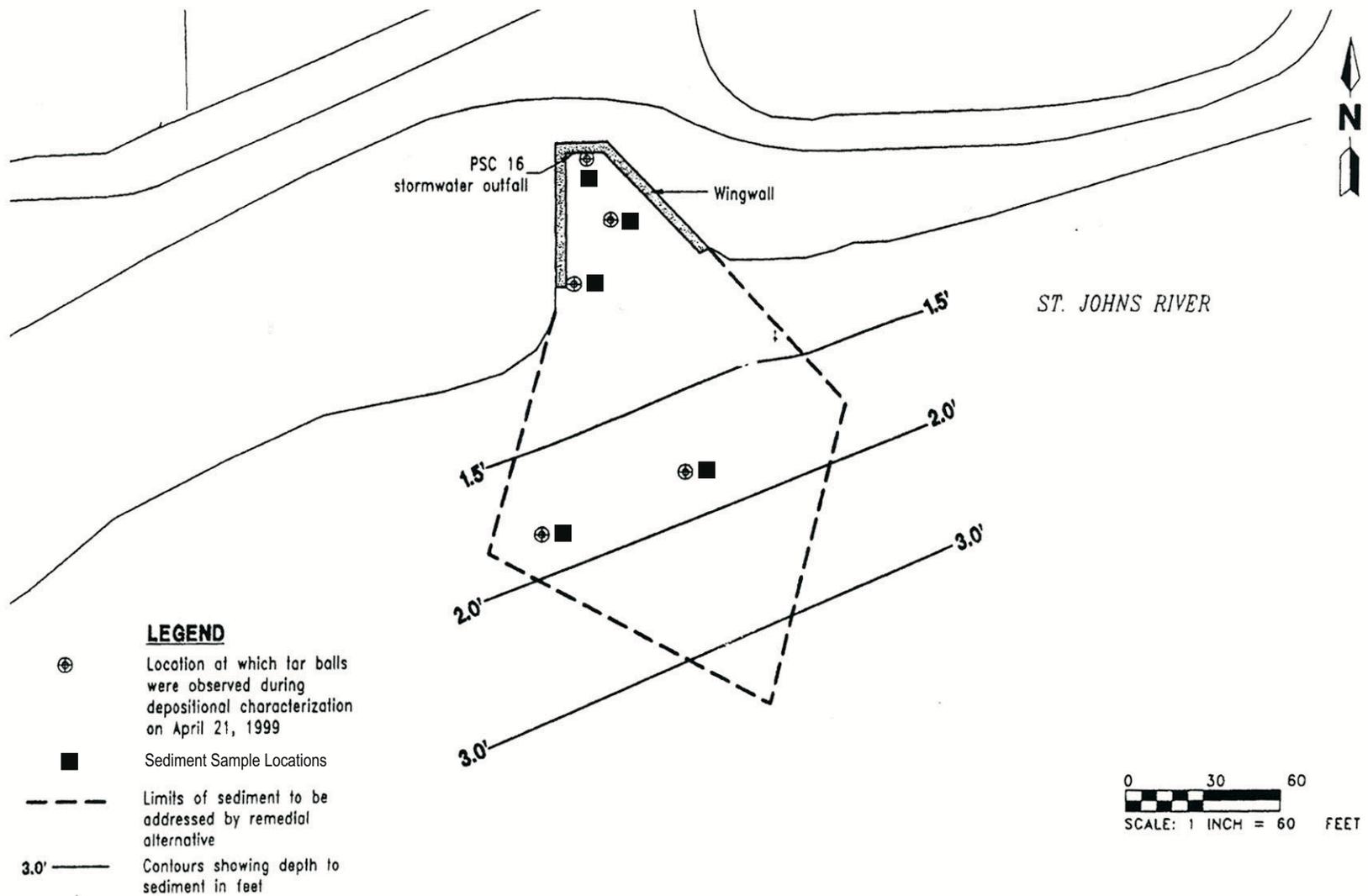
## **2.1.5 Site Restoration**

Areas disturbed during work at each site will be restored to previous condition. Restoration of disturbed areas of asphalt or concrete will include compaction to prevent subsidence, followed by the replacement of like-material asphalt or concrete to restore the site to its original condition. All other areas, structures or utilities affected by site operations will be replaced or repaired.



Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 2-5**  
 PSC 16  
 Proposed Tar Ball Removal Area  
 NAS Jacksonville  
 Jacksonville, Florida



Note: Original figure and Total Chlorinated Solvent Contours courtesy of Remedial Investigation and Feasibility Study, Operable Unit 3, HLA, April 2000.

**Figure 2-6**  
 PSC 16  
 Post-Tar Ball Removal  
 Sediment Sampling Locations  
 NAS Jacksonville  
 Jacksonville, Florida

## 2.1.6 Decontamination

Personnel and equipment will be properly decontaminated to remove all contamination that may be adhering to personnel or equipment as a result of remedial activities. Any water accumulated during the decontamination process will be containerized in 55-gallon drums; sampled in accordance with Section 3.0 Sampling and Analysis Plan; and managed, transported, and disposed in accordance with Section 4.0 Waste Management Plan. All debris generated by remediation activities will be properly contained and disposed of at a facility permitted to accept the waste. Section 4.0 Waste Management Plan describes requirements for onsite management and offsite disposal of all wastestreams, including drill cuttings and purge water. Decontamination of personnel and equipment will be performed in accordance with the site-specific Health and Safety Plan provided in Appendix F and the applicable provisions of 29 Code of Federal Regulations (CFR) 1910.120.

## 2.1.7 Demobilization

During demobilization, temporary facilities, utilities, and equipment will be removed from the site. In addition, any debris or solid waste material remaining from construction activities will be removed and properly disposed offsite in accordance with Section 4.0 Waste Management Plan.

## 2.2 Project Schedule

The major project activities and estimated durations for each are outlined below.

### Area C

- Pre-construction Meeting/Submittal Preparation/Reviews 6 weeks
- Plume Delineation Sampling and Analysis Event 3 weeks
- Monitoring Well Installation 2 days
- Baseline Groundwater Sampling and Analysis Event 1 day
- Final HRC Injection Design and Approval 6 weeks
- Initial HRC Injection 4 weeks
- Groundwater Monitoring Program 1 year
- Yearly HRC Re-injection 1 week
- HRC Injection Completion Report 6 weeks

### Area D

- Pre-construction Meeting/Submittal Preparation/Reviews 6 weeks
- Plume Delineation Sampling and Analysis Event 4 weeks
- Monitoring Well Installation 2 days
- Baseline Groundwater Sampling and Analysis Event 1 day
- Final HRC Injection Design and Approval 6 weeks
- Initial HRC Injection 5 weeks
- Groundwater Monitoring Program 1 year
- Yearly HRC Re-injection 3 weeks
- HRC Injection Completion Report 6 weeks

**PSC 16**

- Pre-construction Meeting/Submittal Preparation/Reviews 6 weeks
- Pre-Tar Ball Removal Inspection 1 week
- Tar Ball Removal 4 weeks
- Pre-Tar Ball Removal Sediment Sampling and Analysis Event 1 week
- Tar Ball Removal Completion Report 6 weeks

CCI/J.A. Jones anticipates the total project duration (from pre-construction conference through submittal of the final completion report) will be approximately 84 weeks. This proposed schedule may vary depending on the actual conditions encountered in the field. Appendix A provides a schedule for the work to be performed.

**2.3 Communications Plan**

A communication matrix outlining the lines of communications for Southern Division, NAVFAC and CCI/J.A. Jones is presented in Table 2-1. Table 2-2 provides a project personnel directory.

**TABLE 2-1**  
Communications Matrix

<b>CCI/J.A. Jones Position</b>	<b>Navy Direct Report</b>
Ray Tyler, Executive Sponsor	Eva Clement, CO
R. Scott Newman, Program Manager	Jimmy Jones, COTR Richard Stanley, ACO
Philip Altman, Senior Project Manager	Jimmy Jones, COTR Richard Stanley, ACO
Michael Halil, CTO Project Manager	Dana Gaskins, RPM Larry Blackburn, NTR/ROICC Tim Curtin, NAS Jacksonville

CO – Contracting Officer  
 ACO – Administrative Contracting Officer  
 NTR – Navy Technical Representative  
 RPM – Remedial Project Manager  
 COTR – Contracting Officer’s Technical Representative

**TABLE 2-2**  
Project Personnel Directory

<b>Contact</b>	<b>Company</b>
R. Scott Newman, Program Manager	CH2M HILL Constructors, Inc
Philip Altman, Senior Project Manager	115 Perimeter Center Place, N.E.
Marsha Robinson, Contracts Administration Manager	Suite 700
Bob Nash, Health and Safety Manager	Atlanta, GA 30346-1278
Theresa Rojas, QA/QC Manager	770/604-9095
Michael Halil, Project Manager	J.A. Jones Environmental Services Company 6219 Authority Avenue Jacksonville, FL 32221 904/777-4812

**TABLE 2-2**  
Project Personnel Directory

	Contact	Company
Eva Clement, CO		Southern Division NAVFAC P.O. Box 190010 North Charleston, SC 29419-9010 843/820-5518
Richard Stanley, ACO		As above 843/820-5939
Jimmy Jones, COTR		As above 843/820-5544
Dana Gaskins, RPM		As above 843/820-5628
Larry Blackburn, NTR/ROICC		Southern Division NAVFAC Resident Officer in Charge of Construction P. O. Box 139, Building 13 NAS Jacksonville, FL 32212-0139 904/542-5571, ext. 117 904/237-1868 (mobile)
Tim Curtin, NAS Jacksonville Environmental Manager		Facilities Engineering Command Building 27 NAS Jacksonville, FL 32212 904/542-2717, ext. 120

## 2.4 Traffic Control Plan

Traffic control at each site will be the responsibility of the CCI/J.A. Jones Site Superintendent. CCI/J.A. Jones will minimize disturbance to facility operations during project activities. CCI/J.A. Jones will consult with onsite Navy personnel to evaluate site access, placement of equipment, and traffic flow to minimize the impact of this work to Station operations. CCI/J.A. Jones will review all Navy regulations and standard operating procedures regarding vehicle movement and control inside the Station.

# 3.0 Sampling and Analysis Plan

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The Sampling and Analysis Plan provided in this Work Plan Addendum outlines the required sampling activities associated with the Remedial Action at OU 3, Areas C and D and PSC 16 located at NAS Jacksonville, Jacksonville, Florida. This SAP outlines the required locations, frequency, and analyses for the sediment, soil, and groundwater samples to be collected. In addition, this SAP provides the required analyses for disposal characterization for wastes generated during these remedial activities.

The NAS Jacksonville Basewide Work Plan provides sample collection frequency and sampling methodology for waste characterization and incidental samples collected during the construction phase of the project completed under this contract; sample QA/QC procedures to be maintained during all sample collection activities; and sample equipment decontamination procedures.

Samples will be collected in accordance with the FDEP SOPs, Department of Environmental Regulation QA-001/92 and the USEPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM). The more stringent requirements of the two documents will be applied. The sampling team will have an FDEP-approved Comprehensive Quality Assurance Plan (CompQAP).

## 3.1 Data Quality Objectives for Measurement Data

The data quality objectives for each sampling task described above are listed in Table 3-1. The sampling and analytical requirements, along with the required level of QC and data packages are listed in Table 3-2.

A Navy-, United States Army Corps of Engineers- (USACE), or Air Force Center for Environmental Excellence-(AFCEE) approved laboratory will be used for all sample analyses. In addition, the laboratory will also have a FDEP-approved CompQAP.

**TABLE 3-1**  
Data Quality Objectives

Sampling Activity	Data Quality Objective Category
Plume Delineation – groundwater (onsite/offsite laboratory)	Screening
Baseline and quarterly groundwater sampling (offsite laboratory)	Definitive
Groundwater Sampling (field measurements including temperature, pH, conductivity, water level measurements, and turbidity)	Screening
Soil sampling using PID	Screening
Soil sampling (offsite laboratory)	Definitive
Tar ball removal sampling (offsite laboratory)	Definitive
Tar ball removal water sampling (field measurements including salinity, dissolved oxygen, pH, and temperature)	Screening
Waste characterization of the soils and aqueous waste (offsite laboratory analyses)	Definitive

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
<b>Area C</b>													
Delineation Groundwater Sampling	Intervals of 22'-26'; 26'-30'; 30'-34'; 34'-38'; 38'-42'; 42'-46' at locations shown in Figure 2-1	Water	Once	Will vary depending on size of plume; Duplicates at 10%; MS/MSD at 5%; one sample per day to be sent to offsite lab	Grab	Geoprobe rig; peristaltic pump; Teflon tubing	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	MW-31	Water	Once	1	Grab	Peristaltic pump; Teflon tubing	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment	10%	Prepared in Field	Analyte-free water, SS funnel	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned equipment (if equipment is decontaminated in the field)	as needed	Prepared in Field	Analyte-free water, SS funnel	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Trip Blank	Water	1 per cooler containing volatile samples	as needed	Prepared by Lab	N/A	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
Soil Sampling	At source location at vertical source interval	Soil	Once	1	Grab	Geoprobe rig	7 day	DQO Level III, CCI Level B	Volatiles	8260B	14 days	Cool to 4°C	(3) 5g EnCore Samplers

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Groundwater Monitoring - Pre/Post-HRC Injections	Source location (CW-16, MW-31, and up and downgradient of CW-16 (See Figure 2-1)	Water	Baseline and Quarterly	4 + 1 dup + 1 MS/MSD (only 8260B) per event; Total per event = 7	Grab	Peristaltic pump; Teflon tubing	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
									Dissolved Iron	6010B	6 months	Cool to 4°C; Filter in lab	(1) 500 mL HDPE
									Dissolved Manganese	6010B	6 months	Cool to 4°C; Filter in lab	(1) 500 mL HDPE
									Nitrate	352.1	48 hours	Cool to 4°C	(1) 250 mL HDPE
									Sulfate	375	28 days	Cool to 4°C	(1) 250 mL HDPE
									Sulfide	376	7 days	NaOH pH>9, Zn Acetate; Cool to 4°C	(1) Liter HDPE
									Chloride	325	28 days	Cool to 4°C	(1) 250 mL HDPE
									Alkalinity	310	14 days	Cool to 4°C	(1) 250 mL HDPE
									Total Organic Carbon	415	28 days	HCl/H <sub>2</sub> SO <sub>4</sub> pH< 2; Cool to 4°C; DARK	(2) 40 mL AMBER vials
									Metabolic Acids	HPLC/UV	14 days	Cool to 4°C	(1) L Amber Glass
									Carbon Dioxide	R.S. Kerr method (lab dependent)	7 days	Cool to 4°C	(2) 40 mL vials
									Methane, Ethane, Ethene	ASTM D1945	14 days	Cool to 4°C	(2) 40 mL vials
	Source location (CW-16, MW-31, and up and downgradient of CW-16 (See Figure 2-1)	Water	Baseline and Quarterly	4 per event	Grab	Thermometer, pH meter, turbidity meter, conductivity meter (combination meter); ORP meter, DO meter, Ferrous Iron Hach kit	ASAP	DQO Level II, Screening	Temperature, pH, turbidity, conductivity, ORP, DO, Ferrous Iron	Various meters, Hach kit	N/A	N/A	N/A
	Pre-Equipment Rinsate	Water	1 per set of pre-cleaned	1 per event (10%)	Prepared in Field	Analyte-free water, SS	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned (if equipment are decontaminated in the field)	as needed	Prepared in Field	Analyte-free water, SS funnel	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Trip Blank	Water	1 per cooler containing	as needed	Prepared by Lab	N/A	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
<b>Area D</b>													
Delineation Groundwater Sampling	Intervals of 23'-27'; 27'-31'; 31'-35'; 35'-39'; 39'-43'; 43'-47'; 47'-51'; 51'-55' at locations shown on Figure 2-3	Water	Once	Will vary depending on size of plume; Duplicates at 10%; MS/MSD at 5%; one sample per day to be sent to offsite lab	Grab	Geoprobe rig; peristaltic pump; Teflon tubing	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment	10%	Prepared in Field	Analyte-free water, SS funnel	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned equipment  (if equipment are decontaminated in the field)	as needed	Prepared in Field	Analyte-free water, SS funnel	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	Trip Blank	Water	1 per cooler containing volatile samples	as needed	Prepared by Lab	N/A	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	MW-30	Water	Once	1	Grab	Peristaltic pump; Teflon tubing	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
	GEW002	Water	Once	1	Grab	Peristaltic pump; Teflon tubing	ASAP	DQO Level II, Screening	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
Soil Sampling	At source location at vertical source interval	Soil	Once	1	Grab	Geoprobe rig	7 day	DQO Level III, CCI Level B	Volatiles	8260B	14 days	Cool to 4°C	(3) 5g EnCore Samplers

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Groundwater Monitoring - Pre/Post-HRC Injections	Source location (CW-43, D01, and upgradient of D01 and downgradient of CW-43; MW-30; GEW002 (See Figure 2-3))	Water	Baseline and Quarterly	6 + 1 dup + 1 MS/MSD (only 8260B/TAL Metals) per event; Total per event = 9	Grab	Peristaltic pump; Teflon tubing	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials
									TAL Metals	6010B/7470A	6 months/Hg = 28 days	HNO <sub>3</sub> pH< 2; Cool to 4°C	(1) 500ml HDPE
									Dissolved Iron	6010B	6 months	Cool to 4°C; Filter in lab	(1) 500 mL HDPE
									Dissolved Manganese	6010B	6 months	Cool to 4°C; Filter in lab	(1) 500 mL HDPE
									Nitrate	352.1	48 hours	Cool to 4°C	(1) 250 mL HDPE
									Sulfate	375	28 days	Cool to 4°C	(1) 250 mL HDPE
									Sulfide	376	7 days	NaOH pH>9, Zn Acetate; Cool to 4°C	(1) Liter HDPE
									Chloride	325	28 days	Cool to 4°C	(1) 250 mL HDPE
									Alkalinity	310	14 days	Cool to 4°C	(1) 250 mL HDPE
									Total Organic Carbon	415	28 days	HCl/H <sub>2</sub> SO <sub>4</sub> pH< 2; Cool to 4°C; DARK	(2) 40 mL AMBER vials
									Metabolic Acids	HPLC/UV	14 days	Cool to 4°C	(1) L Amber Glass
	Carbon Dioxide	R.S. Kerr method (lab dependent)	7 days	Cool to 4°C	(2) 40 mL vials								
	Methane, Ethane, Ethene	ASTM D 1945	14 days	Cool to 4°C	(2) 40 mL vials								
Source location (CW-43, D01, and upgradient of D01 and downgradient of CW-43; MW-30; GEW002 (See Figure 2-3))	Water	Baseline and Quarterly	6 per event	Grab	Thermometer, Ferrous Iron Hach kit, pH, turbidity, conductivity (combination), ORP, DO meters,	ASAP	DQO Level II, Screening	Temperature, pH, turbidity, conductivity, ORP, DO, Ferrous Iron	Various meters, Hach kit	N/A	N/A	N/A	
Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment	1 per event (10%)	Prepared in Field	Analyte-free water, SS funnel	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials	
								TAL Metals	6010B/7470A	6 months/Hg = 28 days	HNO <sub>3</sub> pH< 2; Cool to 4°C	(1) 500ml HDPE	
Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned (if equipment are decontaminated in the field)	as needed	Prepared in Field	Analyte-free water, SS funnel	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials	
								TAL Metals	6010B/7470A	6 months/Hg = 28 days	HNO <sub>3</sub> pH< 2; Cool to 4°C	(1) 500ml HDPE	
Trip Blank	Water	1 per cooler containing	as needed	Prepared by Lab	N/A	14 days	DQO Level III, CCI Level C	Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 mL vials	

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
<b>Post-Tar Ball Removal Sediment Sampling</b>													
Sediment sampling after removal of tar balls	5 locations shown on Figure 2-6	Sediment	Once	5 + 1 dup + 1 MS/MSD Total = 8	Grab	Ponar Dredge or similar device	14 days	DQO Level III, CCI Level C	PAHs + 1-& 2-Methylnaphthalene	8310	14 days ext; 40 days analysis	Cool to 4°C	(2) 8 oz glass
									Lead	6010B	6 months	Cool to 4°C	
									Grain size	physical testing (ASTM)	N/A	Cool to 4°C	(1) 8 oz amber glass
									Total Organic Carbon	9060	ASAP	Cool to 4°C; DARK	(1) 4 oz amber glass
									10-day Toxicity test for <i>Leptocheirus plumulosus</i>	EPA\600\IR-94\025	ASAP	N/A	As needed by lab
	5 locations shown on Figure 2-6	Water	Once	5 per event	Grab	Direct-read Meter	ASAP	DQO Level II, Screening	Salinity, Dissolved Oxygen, pH, and Temperature	Direct-read Meter	N/A	N/A	N/A
	Pre-Equipment Rinsate Blank	Water	1 per set of pre-cleaned equipment	1 per event (10%)	Prepared in Field	Analyte-free water, SS funnel	14 days	DQO Level III, CCI Level C	PAHs + 1-& 2-Methyl-naphthalene	8310	7 days ext; 40 days analysis	Cool to 4°C	(1) Liter amber glass
									Lead	6010B	6 months	Cool to 4°C	(1) 500 mL HDPE
	Post-Equipment Rinsate Blank	Water	1 per set of field-cleaned equipment (if equipment are decontaminated in the field)	as needed	Prepared in Field	Analyte-free water, SS funnel	14 days	DQO Level III, CCI Level C	PAHs + 1-& 2-Methyl-naphthalene	8310	7 days ext; 40 days analysis	Cool to 4°C	(1) Liter amber glass
									Lead	6010B	6 months	Cool to 4°C	(1) 500 mL HDPE
<b>Disposal of Aqueous and Solid Waste</b>													
Disposal of Aqueous Waste from well development, purge water, decon water, other misc liquid	Drums	Water	One per 6 drums or one per container or as required by disposal facility	as needed	Grab	Drum thief or dip jar	14 days	DQO Level III, CCI Level B	TCL Volatiles	8260B	14 days	HCl pH< 2; Cool to 4°C	(2) 40 ml vial
									TCL Semi-volatiles	8270C	7 days ext; 40 days	Cool to 4°C	(3) 1L amber glass
									TCL Pesticides	8081A	7 days ext; 40 days		
									Herbicides	8151A	7 days ext; 40 days	HCl pH< 2; Cool to 4°C	(1) L amber glass
									TPH	TX1005	7 day extr; 40 day		
									8 RCRA Metals	6010B/7470A	6 months/Hg = 28 days	HNO <sub>3</sub> pH< 2; Cool to 4°C	(1) 500ml HDPE
									Reactivity	1010/1020A	ASAP	Cool to 4°C	(1) 500ml HDPE
									Ignitability	9040B	ASAP		
									Corrosivity	Chapter 7.3	ASAP		

**TABLE 3-2**  
Sampling and Analytical Summary

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT <sup>1</sup>	DQO Level/ Data Package Reqmnt	Required Analysis	Analytical Method	Holding Time	Sample Preservtn	Containers
Solids Disposal (Drill Cuttings, Tar balls)	Drums	Soil	One per 6 drums or as required by disposal facility (tar balls will be kept separate from other waste)	as needed	Dig to approx 12" for sample	SS Auger, SS Spoons, SS Bowl	14 days	DQO Level III, CCI Level B	TCLP Volatiles	1311/8260B	14 day TCLP extr; 14 day analysis	Cool to 4°C	(1) 4 oz amber glass
									TCLP Semi-Volatiles	1311/8270C	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Pesticides	1311/8081A	14 day TCLP extr; 7 day extr; 40 day analysis	Cool to 4°C	(1) 16 oz amber glass
									TCLP Herbicides	1311/8151A	14 day TCLP extr; 7 day extr; 40 day analysis		
									TCLP Metals	1311/6010B, 7470A	6 month TCLP extr; 6 month analysis Hg: 28 day TCLP extr; 28 day analysis	Cool to 4°C	(1) 16 oz amber glass
									TPH	TX1005	7 day extr; 40 day analysis		
									Ignitability	1030	ASAP		
Corrosivity	9045C	ASAP											
Reactivity	Chapter 7.3	ASAP											

TAT is in calendar days.

## **3.2 Area C**

### **3.2.1 Plume Delineation**

Additional groundwater samples will be collected to verify and update previous data collection events. Groundwater samples will be collected at the locations shown on Figure 2-1 using a DPT or Geoprobe rig.

The initial groundwater samples will be collected from the source area locations adjacent to CW-16 and existing monitoring well MW-31 at intervals of 22 to 26 feet bls (or directly above the clay layer), 26 to 30 feet bls, 30 to 34 feet bls, 34 to 38 feet bls, 38 to 42 feet bls, and 42 to 46 feet bls to verify the vertical source interval(s). Groundwater samples will then be collected from the other sample locations on Figure 2-1 at the vertical source interval(s) and the intervals directly above and below the vertical source interval(s).

Groundwater samples will be collected using the Geoprobe rig and the attached peristaltic pump and analyzed at the onsite mobile laboratory for volatiles by USEPA SW-846 Method 8260B. Based on these results, additional sample locations may be added if the plume is not sufficiently delineated with the initial sampling. In addition, a groundwater sample will be collected from MW-31.

A soil core sample will also be collected from the source location at the vertical source interval using the Geoprobe rig. The sample will be screened using a PID then analyzed by the offsite mobile laboratory for volatiles by USEPA SW-846 Method 8260B.

One groundwater sample per day will be split and sent to an offsite laboratory as a QC measure to the on-site laboratory. The onsite mobile laboratory will provide screening data to quickly determine the movement of the sample locations. The offsite laboratory will be approved by the Navy, AFCEE, or USACE and also have an FDEP-approved CompQAP.

All drill cuttings and purge water will be placed directly into drums and will be characterized and disposed of in accordance with Section 4.0 Waste Management Plan.

CCI Level C package will be required from the offsite laboratory along with appropriate QC samples for the groundwater samples. All analytical data will be submitted by both hard copy and electronic files.

### **3.2.2 Baseline and Quarterly Groundwater Sampling**

Four monitoring wells will be installed following plume delineation. Only three may need to be installed if existing well MW-31 is properly placed and can be used for HRC performance monitoring. A baseline groundwater sampling event will be followed by quarterly sampling of four wells in accordance with Table 3-2 to monitor the effectiveness of the HRC injection and to evaluate the necessity and timing of any future re-injections.

## 3.3 Area D

### 3.3.1 Plume Delineation

Additional groundwater samples will be collected to verify and update previous data collection events. Groundwater samples will be collected at the locations shown on Figure 2-3 using a DPT or Geoprobe rig.

The initial groundwater samples will be collected from the source area locations adjacent to CW-43 and D01 at intervals of 23 to 27 feet bls (or directly above the clay layer), 27 to 31 feet bls, 31 to 35 feet bls, 35 to 39 feet bls, 39 to 43 feet bls, 43 to 47 feet bls, 47 to 51 feet bls, and 51 to 55 feet bls to verify the vertical source interval(s). Groundwater samples will then be collected from the other sample locations at the vertical source interval(s) and the intervals directly above and below the vertical source interval(s).

In addition, groundwater samples will be collected from existing pump test well GEW002 and existing monitoring well MW-30.

Groundwater samples will be collected using the Geoprobe rig and the attached peristaltic pump with the exception of existing wells GEW002 and MW-30. These two wells will be sampled in accordance with low-flow methodology. All samples will be analyzed at the onsite mobile laboratory for volatiles by USEPA SW-846 Method 8260B. Based on these results, additional sample locations may be added if the plume is not sufficiently delineated with the initial sampling.

A soil core sample will also be collected from the source location at the vertical source interval using the Geoprobe rig. The sample will be screened using a PID then analyzed by the offsite mobile laboratory for volatiles by USEPA SW-846 Method 8260B.

One groundwater sample per day will be split and sent to an offsite laboratory as a QC measure to the onsite laboratory. The onsite mobile laboratory will provide screening data to quickly determine the movement of the sample locations. The offsite laboratory will be approved by the Navy, AFCEE, or USACE and also have an FDEP-approved CompQAP.

All drill cuttings and purge water will be placed directly into drums and will be characterized and disposed of in accordance with Section 4.0 Waste Management Plan.

CCI Level C package will be required from the offsite laboratory along with appropriate QC samples for the groundwater samples. All analytical data will be submitted by both hard copy and electronic files.

### 3.3.2 Baseline and Quarterly Groundwater Sampling

Four monitoring wells will be installed following plume delineation. A baseline groundwater sampling event will be followed by quarterly sampling of these four installed wells and the two existing wells, GEW002 and MW-30, in accordance with Table 3-2 to monitor the effectiveness of the HRC injection and to evaluate the necessity and timing of any future re-injections.

## 3.4 PSC 16

Post-tar ball removal sediment sampling will involve the collection of sediment samples from five locations as shown on Figure 2-6 after removal of the tar balls as described in Section 2.1.4. Samples will be collected using a Ponar Dredge or similar device in accordance with the USEPA Region IV EISOPQAM. Every effort will be made to collect only the top 2 inches of sediment. Samples will be collected downstream towards the upstream direction across the site. Water parameter samples will be collected from each sediment sample location and analyzed by direct-read meter for salinity, dissolved oxygen, pH, and temperature to assist in the evaluation of the sediment sample analytical results.

Samples will be sent offsite to a Navy-, AFCEE-, or USACE-approved laboratory that also has an FDEP-approved CompQAP and analyzed according to Table 3-2.

CCI Level C package will be required from the offsite laboratory along with appropriate QC samples. All analytical data will be submitted by both hard copy and electronic files.

## 3.5 Groundwater Collection

Groundwater samples will be collected in accordance with the USEPA Region IV EISOPQAM and the FDEP *Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, DEP-QA-001/92*, which were adopted as part of CCI's and its subcontractors' FDEP-approved CompQAP and analyzed in accordance with Table 3-2. The more stringent requirements of the two documents will be applied. It is anticipated that low-flow methodologies will be employed.

## 3.6 Waste Characterization and Incidental Wastestream Sampling and Analyses

### 3.6.1 Soil/Solids Characterization

Waste characterization samples will be collected to evaluate the handling, transportation and disposal (T&D) requirements of any contaminated soil accumulated during DPT activities, monitoring well installation activities, or tar ball removal activities. Soil samples will be collected as follows, delivered to a Navy, USACE, or AFCEE-approved laboratory with an FDEP-approved CompQAP, and analyzed for the parameters listed in Table 3-2.

Soil/solids characterization samples will be collected from the drums prior to disposal. Tar ball material and other soils will be segregated and separate samples collected. One composite sample will be collected from each area or as required by the disposal facility. The samples will be collected as follows:

1. Bore down drum approximately 6 to 12 inches and fill volatile sample container. Container must be packed and have no headspace.
2. Continue to collect several spoonfuls of the soil into a stainless steel bowl.
3. Homogenize the sample by the quartering techniques using the stainless steel spoon.

4. Fill the appropriate sample jars approximately three-fourths full with the homogenized sample.
5. Close the jars, label, and package the samples for shipment to the lab.

A CCI Level B package will be required along with appropriate QC samples for the required waste characterization and incidental wastestream samples. All analytical data will be submitted by both hard copy and electronic files.

### 3.6.2 Water Characterization

Waste characterization samples will be collected to evaluate the handling and T&D requirements of generated decontamination water, monitoring well development water, monitoring well purge water, and any other miscellaneous collected water.

Decontamination water will be segregated for analyses. It is anticipated that the aqueous waste from the various activities will be containerized in drums. Water samples will be collected as follows and delivered to a Navy-, USACE-, or AFCEE-approved laboratory with an FDEP-approved CompQAP, and analyzed for the parameters listed on Table 3-2.

A sample will be collected from the drums using either a dip jar or bailer. The sample containers for volatiles analyses will be filled first. The 40-milliliter vials will be filled so that there is no headspace in each vial. The sample containers for the remaining analyses will then be filled.

A CCI Level B package will be required along with appropriate QC samples for the required waste characterization and incidental wastestream samples. All analytical data will be submitted by both hard copy and electronic files.

## 3.7 Field Activities

### 3.7.1 Sample Collection Activities for Area C

Field activities will be performed as described in Table 3-3.

**TABLE 3-3**  
Area C Field Activities

Field Activity	Frequency	Equipment	Sample Point
DPT groundwater sampling	Intervals of 22'-26'; 26'-30'; 30'-34'; 34'-38'; 38'-42'; 42'-46'	Geoprobe rig, peristaltic pump, onsite mobile laboratory	Locations shown on Figure 2-1
Soil core sample	Once	Geoprobe rig, PID, offsite laboratory	Source location at vertical source interval
Groundwater sampling field measurements	Baseline then quarterly	Thermometer, pH meter, turbidity meter, conductivity meter (combination meter); ORP, DO, Ferrous Iron (Hach kit)	Three to four newly installed wells (depends if MW-31 is located properly); Locations shown on Figure 2-2
Groundwater sampling	Baseline then quarterly	Offsite laboratory (See Table 3-2)	Three to four newly installed wells (depends if MW-31 is located properly); Locations shown on Figure 2-2

### 3.7.2 Sample Collection Activities for Area D

Field activities will be performed as described in Table 3-4.

**TABLE 3-4**  
Area D Field Activities

Field Activity	Frequency	Equipment	Sample Point
DPT groundwater sampling	Intervals of 23'-27'; 27'-31'; 31'-35'; 35'-39'; 39'-43'; 43'-47'; 47'-51'; 51'-55'	Geoprobe rig, peristaltic pump, onsite mobile laboratory	Locations shown on Figure 2-3
Soil core sample	Once	Geoprobe rig, PID, offsite laboratory	Source location at vertical source interval
Groundwater sampling field measurements	Baseline then quarterly	Thermometer, pH meter, turbidity meter, conductivity meter (combination meter); ORP, DO, Ferrous Iron (Hach kit)	Four newly installed wells; Locations shown on Figure 2-3
Groundwater sampling	Baseline then quarterly	Offsite laboratory (See Table 3-2)	Four newly installed wells; Locations shown on Figure 2-3

### 3.7.3 Sample Collection Activities for PSC 16

Field activities will be performed as described in Table 3-5.

**TABLE 3-5**  
PSC 16 Field Activities

Field Activity	Frequency	Equipment	Sample Point
Sediment Sampling	Once after tar ball removal	Ponar Dredge or similar device; offsite laboratory (see Table 3-2)	Five locations shown on Figure 2-6
Water Sampling	Once after tar ball removal	Direct-read meter	Five locations shown on Figure 2-6

## 3.8 Analytical Methods

### 3.8.1 Analytical Methods

Samples will be collected for analytical methods summarized in Table 3-2. Preliminary analytical results will be faxed to Jeff Wilmoth at the following fax number per the turn-around-times listed in Table 3-5 from day of sample receipt. The final hardcopy data and electronic file will be delivered to Jeff Wilmoth within 14 days of sample receipt. The last two quarters of samples will be validated by a third party for verification of data quality if/when results show concentrations are below regulatory limits at the direction of the Project Manager.

Jeff Wilmoth  
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### **3.8.2 Mobile Laboratory**

An onsite mobile laboratory, including a power source, will be mobilized to the site to analyze the groundwater samples collected from the DPT delineation borings for USEPA SW-846 Method 8260B. The onsite mobile laboratory will be provided with a fume hood or other means of ventilation in the sample preparation area.

The onsite mobile laboratory will comply with the methodology as well as with the calibration acceptance criteria for all analyses and analyze QC samples at the frequency specified in the SW-846 Test Methods for Evaluating Solid Waste Physical/Chemical Methods, Third Edition and Updates and this Work Plan Addendum.

Unless otherwise specified, each batch of samples will be accompanied by its associated calibrations, instrument performance checks, laboratory blanks, laboratory control samples/blank spikes, matrix spike duplicates, and laboratory duplicates as specified in the USEPA SW-846 Methods.

The onsite mobile laboratory will complete sample preparation, analyses, re-analyses, and any necessary dilutions within a minimum of 1 to 2 hours and a maximum of 12 hours of laboratory sample receipt. CCI/J.A. Jones will coordinate with the onsite mobile laboratory on the prioritizing of samples.

The onsite mobile laboratory will provide the analytical results and required supporting QC data in hard copy format on a daily basis and in electronic format at the completion of the groundwater contaminant plume delineation.

The on site mobile laboratory personnel will comply with the health and safety requirements outlined in the project Health and Safety Plan provided in Appendix F. The onsite mobile laboratory facility, equipment, supplies, and personnel will be fully decontaminated and demobilized at the close of the project.

# 4.0 Waste Management Plan

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The Waste Management Plan describes the waste management requirements and procedures for remediation activities at OU 3, Areas C and D and PSC 16 located at NAS Jacksonville, Jacksonville, Florida.

The remediation activities at OU3 and PSC 16 will be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Wastes generated during these activities will be managed in a manner consistent with the provisions of the Resource Conservation and Recovery Act (RCRA) and of the FDEP regulations. It is assumed that these provisions are the applicable or relevant and appropriate requirements (ARARs) pertinent to this CERCLA action.

The wastestreams associated with this scope of work may include:

- Aqueous waste (including development and purge water, and decontamination water)
- Drill cuttings
- Spent or contaminated sampling equipment
- PAH- and lead contaminated tar balls removed from sediment at PSC 16
- PPE
- Uncontaminated general construction debris (such as caution tapes, barricades, signs, packing materials).

## 4.1 Waste Characterization

Because the sources of the TCE groundwater contamination at Areas C and D are unknown, it is assumed that any TCE contained in the environmental media is not a listed hazardous waste. Section 3.0 Sampling and Analysis Plan provides detailed information on the waste sampling and analysis requirements. However, in some cases, offsite facilities may require additional analyses to evaluate the wastestream prior to acceptance. All wastes will be classified as required under the RCRA. Uncontaminated wastes and debris will be characterized using process knowledge and generally will be classified as municipal solid waste.

### 4.1.1 Waste Characterization Documentation

Waste characterization information for wastes will be documented on a waste profile form provided by the offsite treatment or disposal facility as part of the waste acceptance process. An approved copy of the waste profile will be received prior to offsite transportation of the material. If generator certification and/or signature are required, Navy personnel will provide.

The profile typically requires the following information:

- Generator (Navy) information including name, address, contact, and phone number
- Site name including street/ mailing address
- Activity generating waste (e.g., site remediation)
- Source of contamination (e.g., JP-5 discharge)
- Historical use for area
- Physical state of waste (e.g., solid, liquid, etc.)
- Applicable hazardous waste codes

## 4.2 Waste Management

### 4.2.1 Waste Storage Time Limit

Hazardous waste must be removed within 90-days from the date of generation and other wastes will be removed from the site as soon as possible. The date of generation is the day that a waste is **first** placed in a container or tank.

### 4.2.2 Labels

All containers/ drums, tanks, and roll-off boxes will be labeled, and labels will be visible. Hazardous waste labels will be used where a site has been pre-characterized, and known to be contaminated with listed or characteristic hazardous wastes.

Pre-printed "Hazardous Waste" labels will include the following information:

- Accumulation start date
- Generator Name: U.S. Navy
- EPA ID number for site
- Waste codes

For containers of less than 110 gallons, the manifest number must be on the label before transporting.

Containers, tanks, and roll-off boxes of known non-hazardous waste will have pre-printed "Non-Hazardous Waste" labels that include the following information:

- Accumulation start date
- Generator Name: U.S. Navy
- Site USEPA ID Number
- Waste-specific information (e.g., contaminated soil)

When waste characterization is unknown and analytical results are pending, the pre-printed "Analysis Pending" label will be used until analytical results are received and reviewed, and a waste designation determined. These wastes will contain the equivalent information provided on a Hazardous Waste label:

- Accumulation start date
- Generator Name: U.S. Navy
- Site EPA ID Number
- Waste-specific information (e.g., contaminated purge water)

### **4.2.3 Waste Management Requirements**

All wastes will be contained or otherwise managed to prevent the spread of contamination. Waste-specific requirements include:

- Aqueous wastes will be contained in drums and tanks.
- Contaminated soil (e.g., drill cuttings) and tar balls will be placed in stockpiles or directly placed in drums or into lined roll-off boxes.
- Contaminated sampling equipment, PPE, and other debris. If decontaminated, these wastes can be disposed as uncontaminated debris/solid waste; if not, these wastes will be managed based on contamination and matrix. For example, contaminated gloves used to remove/handle tar balls would generally not be decontaminated, and would be contained with tar balls for disposal.
- Uncontaminated general construction debris will be placed within roll-off boxes or neatly placed in storage piles, pending offsite disposal.

### **4.2.4 Waste Management Areas**

#### **4.2.4.1 Drums/Small Containers**

- Drums and small containers of hazardous waste will be transported to the temporary accumulation areas on wood pallets and will be secured together with non-metallic bonding.
- Drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration.
- Adequate aisle space (e.g., 30 inches) will be provided for containers such as 55-gallon drums to allow the unobstructed movement of personnel and equipment. A row of drums should be no more than 2 drums wide.
- Each drum will be provided with its own label.
- Drums will remain covered except when removing or adding waste to the drum. Covers will be properly secured at the end of each workday.
- Drums will be disposed of with the contents. If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be decontaminated prior to re-use or before leaving the site.
- Secondary containment will be provided for drums of liquid waste.

#### **4.2.4.2 Portable Tanks**

- Tanks will be inspected upon arrival onsite for signs of deterioration and contamination. Any tank arriving onsite with contents will be rejected.
- Tanks will be provided with covers.
- Each tank will be labeled.
- Tanks will be provided with secondary containment.

#### **4.2.4.3 Roll-off Boxes**

- Roll-off boxes will be inspected upon arrival on-site. Any roll-off containers arriving with contents will be rejected.
- Roll-off boxes for contaminated soil will be provided with covers and disposable liners. Liners will be disposed of as contaminated debris.
- When not in use, securely fastened covers will be installed on all roll-off boxes.
- Old labels will be removed.
- Roll-off containers will be inspected by the transporter after removal of the liner and decontaminated in the event of evidence of liner failure.

#### **4.2.4.4 Stockpiles**

The following procedures will be followed when using stockpiles:

- Stockpiled soil or waste will be provided with liner, cover, and perimeter berm to prevent rupture and release or infiltration of liquids.
  - Minimum 6-mil polyethylene sheeting will be used for liners and covers.
  - The perimeter berm, typically hay bales placed beneath the liner, will be constructed to allow for collection of any free liquids draining from the stockpile.
  - Accumulated free liquids will be pumped (or otherwise removed) to a container.
- Covers and perimeter berms will be secured in-place when not in use and at the end of each workday, or as necessary to prevent wind dispersion or run-off from major precipitation events.
- Construction materials for the stockpiles that contact waste will be disposed of as contaminated debris.

A log documenting accumulation dates will be maintained for waste stored onsite in piles.

#### **4.2.5 Security and Contingency Planning**

In general, all waste storage areas will contain emergency response equipment equivalent to hazard posed by waste. Typical items emergency response will include fire extinguishers, decontamination equipment and an alarm system (if radio equipment is not available to all staff working in storage areas). Spill control equipment (e.g., sorbent pads) will be available in all waste storage areas, and where liquids are transferred from one vessel to another.

#### **4.2.6 Waste/Fuel Storage Area Inspections**

Areas used for waste/container storage will be inspected for malfunctions, deterioration, discharges, and leaks that could result in a release. The following inspection schedule will be followed:

- Daily inspection of containers, tanks and roll-off boxes (for leaks, signs of corrosion, or signs of general deterioration)
- Daily inspection of waste piles (for liner and berm integrity, and accumulation of liquids)
- Daily inspection of fuel storage areas (e.g., look for eroding containment systems and rusting tanks/ancillary equipment)

Waste storage areas will be inspected each day of operation during the scheduled shift (i.e., Monday through Friday). If operations will suspend for more than 7 days, alternate inspection arrangements will be made. Prior to demobilization, all hazardous wastes or materials will be removed from the site.

Inspections will be recorded in the Contractor Quality Control Report, and copies of the report will be maintained onsite and available for review.

## **4.3 Transportation**

Each transportation vehicle and load of waste will be inspected before leaving the site. The quantities of waste leaving the site will be recorded. A contractor licensed for commercial transportation will transport non-hazardous wastes. In the event that wastes are hazardous, the transporter will be licensed in accordance with 49 CFR 171-179. A copy of the documentation indicating that the selected transporter has appropriate licenses will be received prior to transport of any waste material.

### **4.3.1 Manifests/Shipping Documentation**

Each load of waste material will be manifested prior to leaving the site. At a minimum, the manifest form will include the following information:

- Transporter information including name, address, contact and phone number
- Generator information including name, address, contact, and phone number
- Site name including street/ mailing address
- Description of waste
- Type of container
- Quantity of waste (volumetric estimate)

Additionally, each shipment of waste will also have a waste profile, a Land Disposal Restriction (LDR) Notification/Certification for hazardous wastes, and a haul ticket.

If the signed hazardous waste manifest from the designated offsite facility is not received within 35 days, CCI will contact the transporter or the designated facility to determine the status of the waste. If the signed hazardous waste manifest has not been received within 45 days, CCI will prepare an "Exception Report" for the Navy to submit to the State of Florida, as required under 40 CFR 262.42.

### **4.3.2 Transporter Responsibilities**

In general, the transporter will be responsible for weighing loads at a certified scale. For each load of material, weight measurements will be obtained for each full and empty

container, dump truck, or tanker truck. Disposal quantities will be based on the difference of weight measurements between the full and empty container, dump truck, or tanker truck. Weights will be recorded on the waste manifest. The transporter will provide copies of weight tickets with the final manifest to CCI.

The transporter will observe the following practices when hauling and transporting wastes offsite:

- Minimize impacts to general public traffic.
- Repair road damage caused by construction and/or hauling traffic.
- Clean-up material spilled in transit.
- Line and cover trucks/trailers used for hauling contaminated materials to prevent releases and contamination.
- Decontaminate vehicles prior to re-use, other than hauling contaminated material.
- Seal trucks transporting liquids.

All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in the Health and Safety Plan (Appendix F).

No materials from other projects will be combined with materials from NAS Jacksonville.

#### **4.3.2.1 Spill Reporting**

In the event of a spill or release of any waste, the transporter must immediately notify CCI. The pertinent facts and information about the spill will be reported to CCI, and recorded, including:

- Type of material (e.g., soil, sludge, water) and contaminant
- Location
- Estimated volume
- Media affected (e.g., spilled on concrete pad or soil)
- Time of spill/release
- Final disposal of spilled material

The transporter will also report any spill or release of hazardous waste, as required by 49 CFR 171.15, to the National Response Center (NRC) at 800-424-8802 or 202-426-2675. The transporter must also report in writing, as required by 49 CFR 171.16, to the Director, Office of Hazardous Materials Regulations, Materials Transportation Bureau, Department of Transportation, Washington, DC 20590.

For any spill of hazardous waste water from a bulk shipment (e.g., tanker), the transporter will immediately notify the NRC (800-424-8802 or 202 - 267-2675), as required in 40 CFR 263.30.

#### **4.3.2.2 Spill Response**

The transporter will clean up any spill or release of waste (including soil or water) that occurs during transportation, or take such action as may be required or approved by Federal, State, or local officials. Spilled waste will be immediately cleaned up, including soils on the outside of the trucks or other container (e.g., rail car) and on the ground or road surface. Where appropriate, the spilled material (e.g., soil), will be returned to the original waste container. In any case the spilled material will be properly contained and disposed.

#### **4.3.3 Transportation and Disposal Log**

Transportation of wastes will be inventoried the day of transportation from the site using the Transportation and Disposal Log. A carbon copy of the initial manifest form for each load will be retained onsite and attached to the Daily Production Report. All required transportation manifests will be prepared by CCI and signed by an NAS Jacksonville representative.

### **4.4 Disposal of Wastestreams**

Offsite treatment or disposal facilities will use the waste profile and supporting documentation (e.g., analytical data) to determine if they will accept a waste.

Hazardous wastes will be sent to a permitted, RCRA Subtitle C treatment, storage, or disposal (TSD) facility. Consistent with the CERCLA Offsite Policy (58 FR 49200, September 22, 1993), the offsite TSD facility will be determined acceptable by the USEPA Regional Off-Site Contact (i.e., will have "offsite facility approval"). According to 40 CFR 300.400(b), the Regional Contact determines that the facility has no significant violations, and has no releases of hazardous substances (for RCRA Subtitle C facilities). CCI will obtain a record of the facility's approval under this policy.

Non-hazardous, contaminated wastes such as petroleum-contaminated soil will be disposed at a RCRA Subtitle D facility permitted to receive such wastes.

Aqueous wastes may be discharged to the local publicly-owned treatment facility (POTW) with written approval from the facility or the Navy. The point of discharge (e.g., sewer manhole) will be designated by the POTW or the Navy. Otherwise, contained aqueous wastes will be disposed offsite at a facility permitted to accept the waste (e.g., aqueous hazardous wastes to a Subtitle C facility).

Uncontaminated construction debris may be sent to municipal landfills, or landfills designated for construction/demolition debris. The treatment or disposal facility will be responsible for providing a copy of the final waste manifest and for a certificate of treatment or disposal for each load of waste received.

### **4.5 Training**

Training requirements for onsite personnel, including subcontractors, is provided in the Site-Specific Health and Safety Plan (Appendix F).

## 4.6 Records/Reporting

The following records and documents will be maintained:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests, Land Disposal Restriction notifications/certifications, bills of lading, and other shipping records
  - Offsite facility waste receipts, certificates of disposal/destruction
- Training records
- Inspection records

CCI will maintain Material Data Safety Sheets (MSDS) for chemicals and/or hazardous materials brought onsite, including the MSDS for chemicals brought onsite by subcontractors.

## **5.0 Environmental Protection Plan**

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Section 4.0, the Environmental Protection Plan provided in the NAS Jacksonville Basewide Work Plan, addresses the Environmental Protection Plan to be instituted during the performance of this CTO at NAS Jacksonville.

# 6.0 Quality Control Plan

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The QC Plan provided in the NAS Jacksonville Basewide Work Plan details the quality administrators, the project organization for the work to be completed at NAS Jacksonville, and the definable features of work for each project site.

The Submittal Register, included in Appendix B of this Work Plan Addendum, documents submittals in accordance with Appendix B of CCI's Contract Management Plan (dated July 1998). CCI, the Navy, or others will approve submittals as identified in the Submittal Register. All approved submittals will be distributed by CCI to the appropriate Navy personnel (CO, ROICC (in duplicate), etc.), to the project site, and to the project file.

The site-specific project organization chart (Figure 6-1) depicts the chain-of-command for this CTO and the individuals responsible for executing the work as indicated. Individual roles and responsibilities of CTO personnel are summarized in Table 6-1.

## 6.1 Project QC Manager

The Project QC Manager for this work will be Mr. Scott Sloan. Mr. Sloan's Quality Control Orientation Certificate of Completion and a copy of the letter appointing Mr. Sloan as the Project QC Manager are presented in Appendices D and E, respectively. Mr. Sloan has performed QC duties and responsibilities for similar scopes of work under CTO No. 0038 at NAS Jacksonville and CTO No. 0047 at Naval Submarine Base Kings Bay, Georgia and has also performed sampling and analysis QC duties and responsibilities under 12 other CTOs under this contract.

## 6.2 Testing Requirements

Construction testing and environmental analysis laboratories and their certifications; construction testing and environmental sampling and analysis; and test control are described in this section. The Testing Plan and Log is provided in Appendix C.

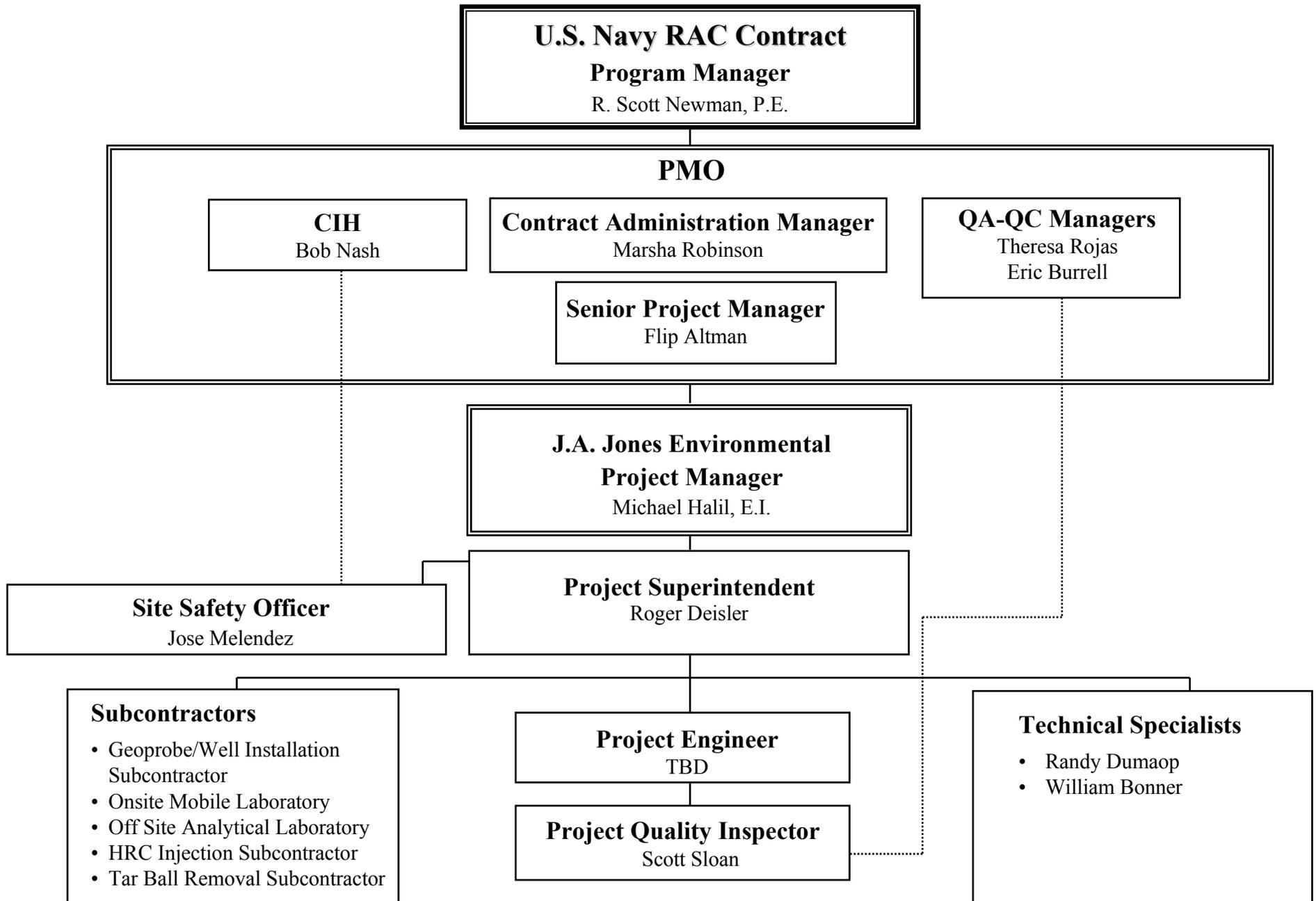
### 6.2.1 Identification and Certification of Testing Laboratories

Construction testing and environmental testing laboratories utilized for this CTO project will function as subcontractors, and have not yet been identified.

### 6.2.2 Construction

Construction testing laboratories will be National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), American Association of State Highway and Transportation Officials (AASHTO), or American Association for Laboratory Accreditation (AALA) certified.

**Figure 6-1**  
**Project Organization Chart**  
**Contract Task Order No. 0058**  
**Remedial Action at Operable Unit 3, Areas C and D and PSC 16, NAS Jacksonville, Florida**



**TABLE 6-1**

Roles, Responsibilities, and Authorities of Individuals Assigned to a Contract Task Order

<b>Role</b>	<b>Responsibility</b>	<b>Authority</b>
Project Manager	<ul style="list-style-type: none"> <li>• Management and technical direction of work</li> <li>• Communication with Southern Division RPM and NTR</li> <li>• Overview subcontractor performance</li> <li>• Select CTO staff</li> <li>• Develop CTO Work Plan and supporting plans</li> <li>• Meet CTO performance objectives</li> <li>• Prepare status reports</li> </ul>	<ul style="list-style-type: none"> <li>• Approve subcontractor selection</li> <li>• Approve invoices to Southern Division</li> <li>• Approve CTO baseline schedule</li> <li>• Stop work at the site for any reason</li> <li>• Approve payment to vendors and suppliers</li> <li>• Approve payment to subcontractors</li> </ul>
Site Superintendent	<ul style="list-style-type: none"> <li>• Responsible for all site activities</li> <li>• Provide direction to subcontractors</li> <li>• Act for Project Manager</li> <li>• Provide daily status reports</li> <li>• Prepare CTO Work Plan</li> <li>• Conduct daily safety meetings</li> <li>• Review subcontractor qualifications</li> <li>• Stop work for unsafe conditions or practices</li> </ul>	<ul style="list-style-type: none"> <li>• Stop work for subcontractors</li> <li>• Approve corrective action for site work-arounds</li> <li>• Approve materials and labor costs for site operations</li> <li>• Resolve subcontractor interface issues</li> <li>• Approve daily and weekly status reports</li> </ul>
Resident Engineer	<ul style="list-style-type: none"> <li>• Monitor and oversee subcontractor compliance with scope of work</li> <li>• Review requests for changes in scope of work</li> <li>• Review technical qualifications of subcontractors</li> <li>• Prepare Field Change Requests</li> <li>• Respond to Design Change Notices</li> <li>• Recommend improvements in work techniques or metrics</li> <li>• Recommend work-around to Site Superintendent</li> </ul>	<ul style="list-style-type: none"> <li>• Approve Field Change Requests below ceiling amount</li> <li>• Complete daily compliance report</li> </ul>
Field Accountant	<ul style="list-style-type: none"> <li>• Provide project scheduling coordination</li> <li>• Responsible for site cost tracking and reporting</li> <li>• Maintain record of site purchases</li> <li>• Maintain government property records</li> </ul>	<ul style="list-style-type: none"> <li>• Approve payables for disposable items</li> </ul>
Transportation and Disposal Coordinator	<ul style="list-style-type: none"> <li>• Develop site specific procedures for transport and disposal practices</li> <li>• Plan and coordinate the transport and disposal of waste</li> <li>• Review subcontractor qualifications</li> <li>• Audit T&amp;D subcontractors compliance with contract requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Approve subcontractors daily report of waste material removed from the site</li> <li>• Approve corrective action plans from T&amp;D subcontractor</li> </ul>
Project Assistant	<ul style="list-style-type: none"> <li>• Maintain CTO files and correspondence</li> <li>• Coordinate CTO schedule and monitor deliverables</li> <li>• Maintain change management records</li> <li>• Maintain Action Tracking System log</li> </ul>	<ul style="list-style-type: none"> <li>• Submit Action Tracking System log</li> <li>• Assign correspondence log numbers</li> </ul>

**TABLE 6-1**

Roles, Responsibilities, and Authorities of Individuals Assigned to a Contract Task Order

<b>Role</b>	<b>Responsibility</b>	<b>Authority</b>
QC Inspector(s)	<ul style="list-style-type: none"> <li>• Monitor and report on subcontractor quality and quantities</li> <li>• Audit subcontractors offsite fabrication</li> <li>• Maintain Submittal Register</li> <li>• Participate in Continuous Improvement Team</li> <li>• Stop work for non-compliant operations</li> <li>• Maintain Lessons Learned Log</li> </ul>	<ul style="list-style-type: none"> <li>• Stop work for non-compliant operations</li> <li>• File daily quantities report</li> <li>• File Lessons Learned Log Sheet</li> <li>• Approve resumption of work for resolved quality issues</li> </ul>
Site Health and Safety Specialist	<ul style="list-style-type: none"> <li>• Monitor and report on subcontractor safety and health performance</li> <li>• Record and report safety statistics</li> <li>• Conduct needed site safety and health orientation</li> <li>• Maintain Environmental Log</li> <li>• Stop work for unsafe practices or conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Stop work for unsafe practices or conditions</li> <li>• Approve subcontractor site specific health and safety plan</li> <li>• Set weekly safety objectives</li> <li>• Approve resumption of work for resolved safety issues</li> </ul>
Subcontract Specialist	<ul style="list-style-type: none"> <li>• Prepare bid packages</li> <li>• Purchase disposable materials</li> <li>• Maintain subcontract log</li> </ul>	

### **6.2.3 Environmental**

Laboratories performing analysis of environmental samples will be Navy-, USACE-, or AFCEE-approved. The laboratories will also have an FDEP-approved CompQAP.

### **6.2.4 Testing and Sampling**

CCI/J.A. Jones will sample the sediment, soil, groundwater, and all generated or accumulated solid and aqueous wastes.

#### **6.2.4.1 Construction Testing**

No construction testing is anticipated for work performed under this CTO work activity.

#### **6.2.4.2 Environmental Sampling and Analysis**

Environmental sampling and analysis, including QC sampling and analysis, is specified in Section 3.0 Sampling and Analysis Plan. Samples will be collected in accordance with USEPA Methods and industry standards of practice. Additionally, personnel that perform sampling will meet the requirements stated in the Navy Installation Restoration Chemical Data Quality Manual – September 1999.

### **6.2.5 Test Control**

Environmental samples will be collected in accordance with USEPA Methods and procedures. Other controls will include, but are not limited to, maintaining a chain of custody; proper handling, packing, and shipping; and the use of qualified laboratories. The QC reports required for this project are listed in Table 6-2.

**TABLE 6-2**  
Test Control Schedule

<b>QC Report/Log</b>	<b>Submittal Frequency</b>
Contractor Production Report	Daily
Contractor QC Report	Daily
Testing Plan and Log	Monthly
QC Meeting Minutes	As Performed
Rework Items List	Monthly
Submittal Register	As Updated

The Project QC Manager will verify the following:

- Facilities and testing equipment are available and comply with testing standards.
- Well monitoring test instrument is calibrated in accordance with manufacturer's instructions.
- Well sampling is conducted in accordance with the FDEP Standard Operating Procedures for Laboratory Operations and Sample Collection Activities, DEP-QA-001/92.
- Recording forms, including all of the test documentation requirements, have been prepared and are accurate and complete

### **6.3 CTO Support Organizations**

The supporting organizations are yet to be determined.

## **Appendix A**

### **CPM Project Schedule**

Activity ID	WBS CHARGE #	% Comp	Activity Description	Orig Dur	Rem Dur	Early Start	Early Finish	2001												2002											
								J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J				
<b>CTO #0058 - NAS JACKSONVILLE</b>																															
Subtotal		0		402	402	11JUN01	17JAN03																								
<b>PHASE 3</b>																															
Subtotal		0		402	402	11JUN01	17JAN03																								
<b>REMEDIAL ACTION AT AREA C</b>																															
<b>PROJECT MANAGEMENT</b>																															
BV99220101	99.22.01.01	0	Project Management	402	402	11JUN01*	17JAN03																								
<b>MOBILIZATION &amp; PREPARATORY WORK</b>																															
BV31010394	31.01.03.94	0	Subcontractor Pre-Con Submittals	25	25	13AUG01	17SEP01																								
BV31010292	31.01.02.92	0	HRC Injection Subcontractor Mobilization	5	5	18SEP01	24SEP01																								
BV31221290	31.22.12.90	0	Subcontractor Bonds	1	1	18SEP01	18SEP01																								
BV99010290	99.01.02.90	0	CTO Pre-Construction Meeting	1	1	18SEP01	18SEP01																								
BV31010293	31.01.02.92	0	HRC Injection Subcontractor Mobilization	5	5	18NOV02	22NOV02																								
<b>MONITORING, SAMPLING, TEST &amp; ANALYSIS</b>																															
BV31020502	31.02.05.02	0	GeoProbe Sampling	15	15	11JUN01	29JUN01																								
BV31020990	31.02.09.90	0	Delineation Analysis	10	10	18JUN01	29JUN01																								
BV31021302	31.02.13.02	0	Lab for Delineation Analysis	10	10	18JUN01	29JUN01																								
BV31020906	31.02.09.06	0	Waste T&D Characterization	5	5	22JUN01	28JUN01																								
BV31021490	31.02.14.90	0	Independent Data Validation	20	20	02JUL01	30JUL01																								
BV31021491	31.02.14.91	0	Data Evaluation & Management	20	20	02JUL01	30JUL01																								
BV31020907	31.02.09.06	0	Waste T&D Characterization	5	5	13JUL01	19JUL01																								
BV31020402	31.02.04.02	0	Monitoring Well Installation	5	5	16JUL01	20JUL01																								
BV31020901	31.02.09.01	0	Baseline Groundwater Sampling	5	5	23JUL01	27JUL01																								
BV31020902	31.02.09.02	0	Quarterly GW Sampling	5	5	21DEC01*	31DEC01																								
BV31020903	31.02.09.02	0	Quarterly GW Sampling	5	5	18MAR02	22MAR02																								
BV31020904	31.02.09.02	0	Quarterly GW Sampling	5	5	17JUN02	21JUN02																								
BV31020905	31.02.09.02	0	Quarterly GW Sampling	5	5	17SEP02	23SEP02																								
<b>CHEMICAL TREATMENT</b>																															
BV31120901	31.12.09.01	0	Initial HRC Injection	15	15	18SEP01	09OCT01																								
BV31120902	31.12.09.02	0	Yearly HRC Injection	5	5	18NOV02*	22NOV02																								
<b>TRANSPORTATION AND DISPOSAL</b>																															
BV31192190	31.19.21.90	0	T&D of Drums	345	345	30JUL01	13DEC02																								
<b>SITE RESTORATION</b>																															
BV31200390	31.20.03.90	0	HRC SUB Site Restoration	5	5	10OCT01	16OCT01																								

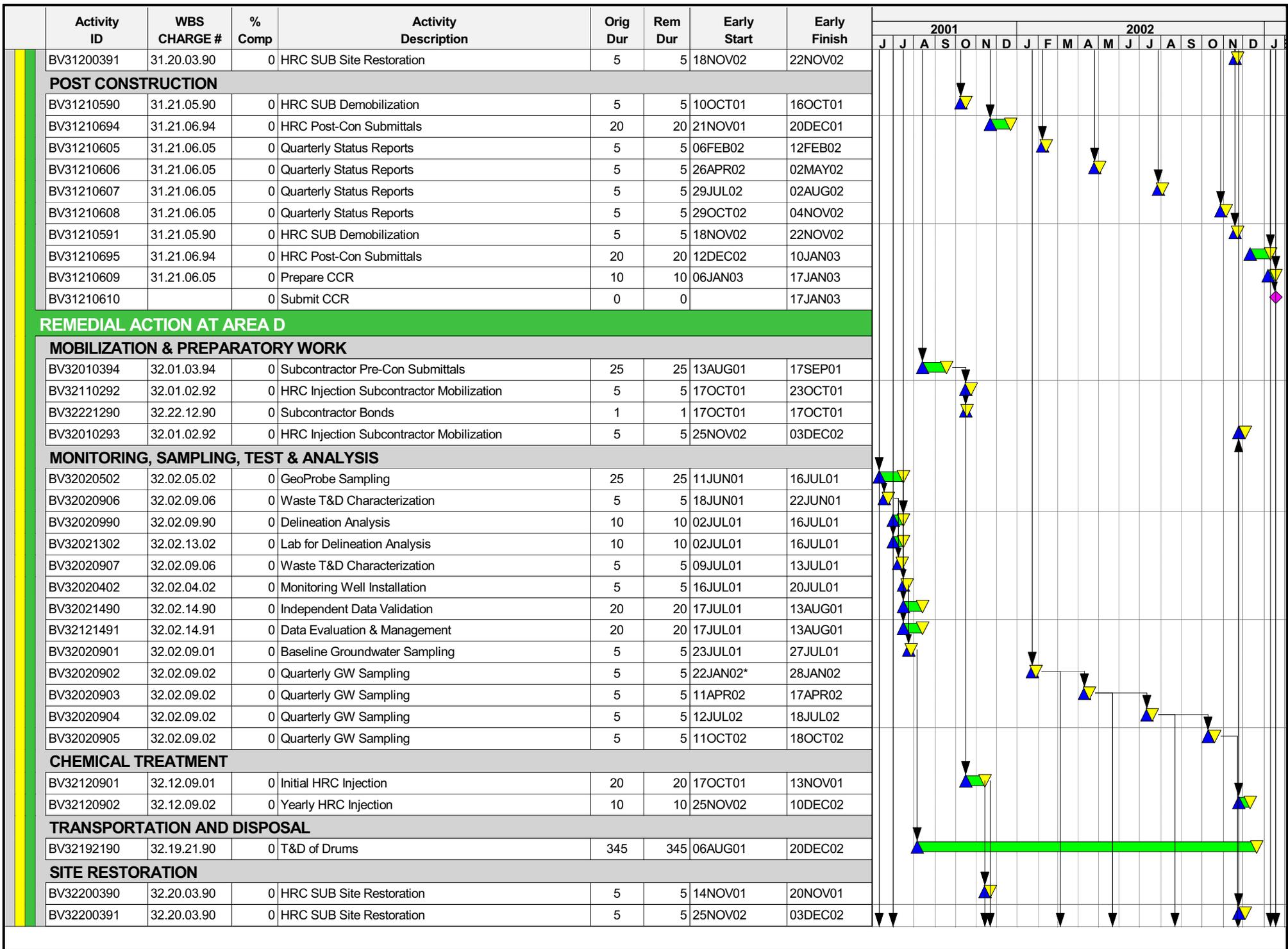
Start Date	22AUG98		Early Bar
Finish Date	17JAN03		Progress Bar
Data Date	30MAR01		Critical Activity
Run Date	12APR01 13:51		

NPAC - CO58 Sheet 1 of 3

**CTO #0058 - NAS JACKSONVILLE  
CTO COMPLETION SCHEDULE  
NAVY RAC SOUTHERN DIVISION**



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**Appendix B**  
**Submittal Register**

## Submittal Register

Contract Number: N62467-98-D-0995			CTO No.: 0058		CTO Title: Remedial Action at OU3, Areas C and D and PSC 16						Location: NAS Jacksonville, Jacksonville, FL				Contractor: CH2M HILL Constructors, Inc./ J.A. Jones Environmental Services Company		
Item Number	Spec Section	Item Description	Para. Number	Approving Authority	Other Reviewers	Submittal Number	Scheduled Submission Date	CCI/JAJ Review Date	CCI/JAJ Disposition	CCI/JAJ Transmit Date	QC Admin Received Date	QC Disposition	QC Admin Transmit Date	Contracting Officer Received	Contracting Officer Disposition	Contracting Officer Return	Remarks
		<b>General Paragraphs</b>															
		SD-09, Reports	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1	--	A Work Plan	--	CO/COTR		1	5/7/01										
2	--	B Narrative	--	CO/COTR		1	5/7/01										
3	--	C Technical Specifications	--	CO/COTR		1	5/7/01										
4	--	D Health and Safety Plan	--	CO/COTR		1	5/7/01										
5	--	E QA/QC Plan	--	CO/COTR		1	5/7/01										
6	--	F Sampling and Analysis Plan	--	CO/COTR		1	5/7/01										
7	--	G Decontamination Procedures	--	CO/COTR		1	5/7/01										
8	--	H Material Safety Data Sheets	--	CO/COTR			As Required										
		SD-18, Records	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9	--	A As Built Records	1.3.1.1	ROICC			As Required										
10	--	B Environmental Conditions Report	1.3.1.2	ROICC			6/11/01										
11	--	C Test Results Summary Report	1.3.1.3	ROICC			Monthly										
12	--	D Daily Production Report	1.3.1.4	ROICC			Daily										
13	--	E Daily QC Report	1.3.1.5	ROICC			Daily										
14	--	F Rework Items List	1.3.1.6	ROICC			Monthly										
15	--	G Permits	1.3.1.7	ROICC			As Required										
16	--	H Quarterly Status Reports	1.3.1.8	CO/COTR			Quarterly										
17	--	I Construction Completion Report	1.3.1.8	ROICC			As Required										During Monitoring 60 days following final injection
		<b>DIV 1 AREA C</b>															
		SD-02, Manufacturer's Catalog Data	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
18	--	A Delineation Geoprobe Rig Specifications	--	CCI/JAJ			As Required										
19	--	B Delineation Sampling Equipment	--	CCI/JAJ			As Required										
20	--	C Delineation Boring Grout/Concrete Materials	--	CCI/JAJ			As Required										
21	--	D Monitoring Well Screen	--	CCI/JAJ			As Required										
22	--	E Monitoring Well Risers	--	CCI/JAJ			As Required										
23	--	F Monitoring Well Covers	--	CCI/JAJ			As Required										
24	--	G HRC Injection Equipment (including rig, pump, etc)	--	CCI/JAJ			As Required										
25	--	H HRC Materials	--	CCI/JAJ			As Required										
26	--	I HRC Boring Grout/Concrete Materials	--	CCI/JAJ			As Required										
		SD-04, Drawings	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27	--	A Final HRC Injection Plan	--	CCI/JAJ			As Required										
28	--	B Final As-builts	--	ROICC			As Required										
		SD-12, Field Test Reports	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
29	--	A Well Construction Records	--	CCI/JAJ			As Required										
30	--	B Calibration Tests	--	CCI/JAJ			As Required										
31	--	C Delineation Groundwater Analytical Results	--	ROICC			As Required										
32	--	D Delineation Soil Analytical Results	--	ROICC			As Required										
33	--	E Groundwater Monitoring Analytical Results	--	ROICC			As Required										
34	--	F Electronic Copy of All Analytical Results	--	ROICC			As Required										
35	--	G Groundwater Monitoring Reports	--	CCI/JAJ			As Required										
		SD-13, Certification	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
36	--	A Laboratory Certification	--	ROICC			As Required										
		SD-18, Records	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
37	--	A Well Driller Certification	--	CCI/JAJ			As Required										
38	--	B Permits	--	CCI/JAJ			As Required										
39	--	C MSDS Sheets	--	CCI/JAJ			As Required										

## Submittal Register

Contract Number: N62467-98-D-0995			CTO No.: 0058		CTO Title: Remedial Action at OU3, Areas C and D and PSC 16						Location: NAS Jacksonville, Jacksonville, FL				Contractor: CH2M HILL Constructors, Inc./ J.A. Jones Environmental Services Company		
Item Number	Spec Section	Item Description	Para. Number	Approving Authority	Other Reviewers	Submittal Number	Scheduled Submission Date	CCI/JAJ Review Date	CCI/JAJ Disposition	CCI/JAJ Transmit Date	QC Admin Received Date	QC Disposition	QC Admin Transmit Date	Contracting Officer Received	Contracting Officer Disposition	Contracting Officer Return	Remarks
	<b>DIV 1</b>	<b>AREA D</b>															
		SD-02, Manufacturer's Catalog Data	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
40	--	A Delineation Geoprobe Rig Specifications	--	CCI/JAJ			As Required										
41	--	B Delineation Sampling Equipment	--	CCI/JAJ			As Required										
42	--	C Delineation Boring Grout/Concrete Materials	--	CCI/JAJ			As Required										
43	--	D Monitoring Well Screens	--	CCI/JAJ			As Required										
44	--	E Monitoring Well Risers	--	CCI/JAJ			As Required										
45	--	F Monitoring Well Covers	--	CCI/JAJ			As Required										
46	--	G HRC Injection Equipment (including rig, pump, etc)	--	CCI/JAJ			As Required										
47	--	H HRC Materials	--	CCI/JAJ			As Required										
48	--	I HRC Boring Grout/Concrete Materials	--	CCI/JAJ			As Required										
		SD-04, Drawings	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
49	--	A Final HRC Injection Plan	--	CCI/JAJ			As Required										
50	--	B Final As-bults	--	ROICC			As Required										
		SD-12, Field Test Reports	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
51	--	A Well Construction Records	--	CCI/JAJ			As Required										
52	--	B Calibration Tests	--	CCI/JAJ			As Required										
53	--	C Delineation Groundwater Analytical Results	--	ROICC			As Required										
54	--	D Delineation Soil Analytical Results	--	ROICC			As Required										
55	--	E Groundwater Monitoring Analytical Results	--	ROICC			As Required										
56	--	F Electronic Copy of All Analytical Results	--	ROICC			As Required										
57	--	G Groundwater Monitoring Reports	--	CCI/JAJ			As Required										
		SD-13, Certification	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
58	--	A Laboratory Certification	--	ROICC			As Required										
		SD-18, Records	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
59	--	A Well Driller Certification	--	CCI/JAJ			As Required										
60	--	B Permits	--	CCI/JAJ			As Required										
61	--	C MSDS Sheets	--	CCI/JAJ			As Required										
	<b>DIV 1</b>	<b>PSC 16</b>															
		SD-02, Manufacturer's Catalog Data	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
62	--	A Sediment Fence	--	CCI/JAJ			As Required										
63	--	B Tar Ball Removal Equipment	--	CCI/JAJ			As Required										
		SD-04, Drawings	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
64	--	A Final Tar Ball Removal Layout	--	CCI/JAJ			As Required										
65	--	B Final As-bults	--	ROICC			As Required										
		SD-12, Field Test Reports	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
66	--	A Post Tar Ball Removal Analytical Results	--	ROICC			As Required										
67	--	B Electronic Copy of All Analytical Results	--	ROICC			As Required										
		SD-13, Certification	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
68	--	A Laboratory Certification	--	ROICC			As Required										
		SD-18, Records	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
69	--	A Permits	--	CCI/JAJ			As Required										
70	--	B MSDS Sheets	--	CCI/JAJ			As Required										
	<b>DIV 1</b>	<b>Waste Sampling Requirements</b>															
		SD-08, Statements	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
71	--	A Sample Log	--	ROICC			Monthly										
		SD-12, Field Test Reports	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
72	--	A Disposal Sample Analytical Results	--	ROICC			As Required										
73	--	B Electronic Copy of All Analytical Results	--	ROICC			As Required										

### Submittal Register

Contract Number: N62467-98-D-0995			CTO No.: 0058		CTO Title: Remedial Action at OU3, Areas C and D and PSC 16						Location: NAS Jacksonville, Jacksonville, FL				Contractor: CH2M HILL Constructors, Inc./ J.A. Jones Environmental Services Company		
Item Number	A Spec Section	B Item Description	C Para. Number	D Approving Authority	E Other Reviewers	F Submittal Number	G Scheduled Submission Date	H CCI/JAJ Review Date	I CCI/JAJ Disposition	J CCI/JAJ Transmit Date	K QC Admin Received Date	L QC Disposition	M QC Admin Transmit Date	N Contracting Officer Received	O Contracting Officer Disposition	P Contracting Officer Return	Q Remarks
		SD-13, Certification	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
74	--	A Laboratory Certification	--	ROICC			As Required										
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		SD-08, Statements	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
75	--	A Treatment Facility Permit	--	ROICC			As Required										
		SD-18, Records	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
76	--	A Shipment Manifests	--	ROICC			As Required										
77	--	B Treatment and Disposal Certificate	--	ROICC			As Required										
	<b>DIV 2</b>	<b>Pavement Removal and Replacement (if required)</b>															
		SD-08, Statements	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
78	--	A Paving Materials	--	CCI/JAJ			As Required										
	<b>DIV 3</b>	<b>Cast-In-Place Concrete (if required)</b>															
		SD-08, Statements	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
79	--	A Concrete Mix Design	--	CCI/JAJ			As Required										

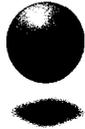
## **Appendix C**

### **Testing Plan and Log**



## **Appendix D**

### **Project QC Manager Certificate of Completion of Quality Control Orientation**



**CH2MHILL**  
Constructors, Inc.



# **CERTIFICATE OF COMPLETION**

*Scott A. Sloan*

*of J.A. Jones Environmental Services, Inc.*

**Has completed the CH2M Hill Constructors, Inc. (CCI) Training Course:**

**QUALITY CONTROL ORIENTATION**

**Course Duration: 8 hours**

**Course Date: May 13, 2000**

**Course Location: Jacksonville, Florida**

---

**Theresa D. Rojas**  
**Program QA/QC Manager**

## **Appendix E**

### **Project QC Manager Appointing Letter**



## CCI NAVY RAC

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CH2MHill Constructors Inc.  
115 Perimeter Center Place, NE  
Suite 700  
Atlanta, GA 30346-1278  
TEL 770.604.9182  
FAX 770.604.9282

May 7, 2000

Mr. Scott Sloan  
J.A. Jones Environmental Services Company  
6219 Authority Avenue  
Jacksonville, Florida 32221

Subject: Contract No. N62467-98-D-0995  
Contract Task Order No. 0058, Operable Unit 3, Areas C and D and PSC 16, NAS  
Jacksonville, Jacksonville, FL  
Quality Control Manager Letter of Authority

Dear Mr. Sloan:

Herein describes the responsibilities and authority delegated to you in your capacity as the Project QC Manager on Contract Task Order No. 0058 under the Navy RAC Contract No. N62467-98-D-0995.

In this position, you assist and represent the QC Program Manager in continued implementation and enforcement of the Project QC Plans. You are responsible for implementing the QC program as described in the Navy RAC contract. You are responsible for managing the site-specific QC requirements in accordance with the Project QC Plans. You are required to attend the coordination and mutual understanding meeting, conduct QC meetings, perform the three phases of control, perform submittal review, perform submittal approval, ensure testing is performed, and prepare QC certifications and documentation required in the Navy RAC Contract.

Your responsibilities further include identifying and reporting quality problems, rejecting nonconforming materials, initiating corrective actions, and recommending solutions for nonconforming activities.

You have the authority to control or stop further processing, delivery, or installation activities until satisfactory disposition and implementation of corrective actions are achieved.

You have the authority to direct the correction of non-conforming work.

Sincerely,

CH2M HILL Constructors, Inc.

R. Scott Newman, P.E.  
Program Manager

## **Appendix F**

### **Health and Safety Plan**

**Health and Safety Plan  
Remedial Action at Operable Unit 3  
Areas C and D and Potential Source of  
Contamination 16**

**Naval Air Station Jacksonville  
Jacksonville, Florida**

**Contract No. N62467-98-D-0995  
Contract Task Order No. 0058**

Revision 00

Submitted to:

**U.S. Naval Facilities  
Engineering Command  
Southern Division**

Prepared by:



115 Perimeter Center Place, N.E.  
Suite 700  
Atlanta, GA 30346

May 2001

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1	Employee Signoff
2	Project-Specific Chemical Product Hazard Communication Form
3	Chemical-Specific Training Form
4	Material Safety Data Sheets
5	Project Self-Assessment Checklist

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# Acronyms

---

°F	degrees Fahrenheit
ALARA	as low as reasonably achievable
APR	air-purifying respirator
ATL	Atlanta
CCI	CH2MHILL Constructors, Inc.
CNS	central nervous system
CPR	cardiopulmonary resuscitation
CTO	Contract Task Order
dBA	decibel A-rated
DOT	Department of Transportation
FA	first aid
FID	flame ionization detector
GFCI	ground fault circuit interrupter
HAZCOM	hazard communication
HR	heart rate
HSM	Health and Safety Manager
HSP	Health and Safety Plan
IDLH	immediately dangerous to life and health
IDW	investigation-derived waste
lb	pound
LEL	lower explosive limit
mg/m <sup>3</sup>	milligrams per cubic meter
MSDS	Material Safety Data Sheet
mW/cm <sup>2</sup>	milliwatt per square centimeter
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NDG	nuclear density gauge
NSC	National Safety Council
OSHA	Occupational Safety and Health Administration
PAPR	powered air-purifying respirator
PDF	personal flotation device
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PSC	Potential Source of Contamination
RMSF	Rocky Mountain Spotted Fever
SAR	supplied-air respirator
SCBA	self-contained breathing apparatus
SHSS	Site Health and Safety Specialist
SOP	standard of practice
STEL	short-term exposure limit
SZ	support zone

## Acronyms continued

TBD	to be determined
TMCC	truck-mounted crash cushion
TSDf	treatment, storage, and disposal facility

This health and safety plan (HSP) will be kept on the site during field activities and will be reviewed and updated as necessary. The plan adopts, by reference, the standards of practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, and CH2M HILL Constructors, Inc. (CCI) Health and Safety Guidelines as appropriate. The Site Health and Safety Specialist (SHSS) is to be familiar with these SOPs and the content of this plan. Site personnel must sign Attachment 1. In addition, this plan adopts procedures in the work plan for the project.

# 1.0 Project Information and Description

---

**Client or Owner:** Southern Division, Navy Facilities Engineering Command (NAVFAC)

**Contract Task Order No:** 0058

**CCI Project Manager:** Mike Halil/J.A.Jones

**Office:** Jacksonville, Florida

**Site Name:** Naval Air Station (NAS) Jacksonville

**Site Address:** Jacksonville, Florida

**Date Health and Safety Plan Prepared:** April 2001

**Date(s) of Initial Visit:** June 1999

**Date(s) of Site Work:** May 2001 – July 2002

**Site Access:** Access is through the Main Gate off Highway 17 at Yorktown Avenue. The Base Pass and Decal office is in Building 9, at the Main Gate. 904/542-4529.

**Site Size:** The site occupies 3,400 acres along the St. Johns River in southern Jacksonville.

**Site Topography:** flat coastal plain

**Prevailing Weather:** hot humid summers with the potential for hurricanes

**Site Description and History:** From 1946 to 1948, NAS Jacksonville was home to the Seventh Naval District. In 1948 the mission was changed from training to supporting the fleet and Commander, Fleet Air Jacksonville was established. The early 1950s saw the start of patrol squadrons with a mission of anti-submarine warfare. Today NAS Jacksonville leads the aviation community with the largest squadron, Patrol squadron Thirty, teaching some of the Navy's best pilots and crew members the fine art of anti-submarine warfare.

Area C is located between Hangers 122 and 123, and Area D is west of Jetline Hanger. Potential Source of Contamination (PSC) 16 encompasses the outfall of the storm water sewer that drains the southern half of Naval Aviation Depot (NADEP), also called the Black Point stormwater discharge.

# 2.0 Project Organization and Tasks to be Performed under this Plan

---

## 2.1 Project Organization

**Client:** Southern Division, Naval Facilities Engineering Command

**CCI:**

Project Manager: Mike Halil/J.A. Jones

Field Team Leader: TBD/ATL

Refer to Section 4.0 for field staff.

**Contractors and Subcontractors:** Refer to Section 4.2.

## 2.2 Description of Tasks

Refer to project documents (i.e., work plan) for detailed task information. A health and safety risk analysis has been performed for each task and is incorporated in this HSP through task-specific hazard controls and requirements for monitoring and protection. Tasks in addition to those listed below require an approved amendment to this plan before additional work begins. Refer to Section 10.2 for procedures related to tasks that do not involve hazardous waste operations and emergency response (HAZWOPER).

### 2.2.1 HAZWOPER-Regulated Tasks

HAZWOPER-regulated tasks include:

- Areas C and D
  - Plume delineation sampling
  - Installation of four monitoring wells
  - Groundwater sampling
  - Hydrogen Release Compounds (HRC) injection
  - Long-term ground water monitoring (1 year)
  - Site Restoration
- PSC 16
  - Pre-Tar Ball removal sediment sampling
  - Tar Ball removal
  - Post-Tar Ball removal sediment sampling
  - Site Restoration

### 2.2.1 Non-HAZWOPER-Regulated Tasks

Under specific circumstances, the training and medical monitoring requirements of federal or state HAZWOPER regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-HAZWOPER-trained personnel. **Prior approval from the Health and Safety Manager (HSM) is required before these tasks are conducted on regulated hazardous waste sites.**

A task hazard analysis is provided in Tables 2-1 and 2-2.

**TABLE 2-1**  
Task Hazard Analysis for Areas C and D

Potential Hazards	Tasks				
	Drilling, Geoprobe, Well installation	Groundwater monitoring, Aquifer testing	Survey	Loading material for offsite disposal	Remedial Construction
Buried Utilities, Drums, Tanks	X				X
Concrete and Masonry Work HS-43	X				X
Drilling HS-35	X				X
Electrical HS-23	X	X	X		X
Fire Protection HS-22	X	X	X	X	X
Hand and Power Tools, HS-50	X	X	X		X
Manual Lifting HS-29	X	X	X		X
Noise >85dBa HS-39	X	X	X	X	X
Traffic Control HS-24	X	X	X	X	X
Visible lighting	X	X	X	X	X

**TABLE 2-2**  
Task Hazard Analysis for PSC 16

Potential Hazards	Tasks			
	Surface water /sediment sampling from boat	Surface water/ sediment sampling from shore	Loading material for offsite disposal	Remedial Construction
Fire Protection HS-22	X	X	X	X
Hand and Power Tools, HS-50	X	X		X
Heavy Equipment HS-27	X		X	X
Manual Lifting HS-29	X	X		X
Noise >85dBa HS-39	X	X	X	X
Visible lighting	X	X	X	X
Working near water		X		X
Working from boat	X			X

## 2.2.2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. Safe work practices and control measures used to reduce or eliminate potential hazards for the activities associated with this project for Areas C and D and for PSC 16 are listed in Tables 2-3 and 2-4, respectively. Inspection and training requirements for equipment for Areas C and D and for PSC 16 are listed in Tables 2-5 and 2-6, respectively. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CCI employees and subcontractors must remain aware of the hazards affecting them regardless of the party responsible for controlling the hazards. CCI employees and subcontractors who do not understand any of these provisions should contact the SHSS for clarification.

In addition to controls specified in this section, activity Self-Assessment Checklist is provided in Attachment 5. This checklist is to be used to assess the adequacy of CCI and subcontractors site-specific safety requirements. Objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing gaps. A Self-Assessment Checklist will be completed weekly and returned to the Senior Project Manager, with a copy to HSM.

**TABLE 2-3**

Recommended Safety Controls for Areas C and D

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
General Hazards	Reduce general safety hazards found at most sites; referenced in CH2M HILL SOP HS-20	<p>Site work will be performed during daylight hours whenever possible. Work conducted during hours of darkness will require enough illumination intensity to read a newspaper without difficulty.</p> <p>Hearing protection worn in areas where you need to shout to hear someone within 3 feet.</p> <p>Good housekeeping must be maintained at all times in project work areas.</p> <p>Common paths of travel established and kept free from accumulation of materials.</p> <p>Provide slip-resistant surfaces, ropes, and /or other devices to be used.</p> <p>Specific areas should be designated for the proper storage of materials.</p> <p>Tools, equipment, materials, and supplies will be stored in an orderly manner.</p> <p>As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.</p> <p>Containers should be provided for collecting trash and other debris and will be removed at regular intervals.</p> <p>Spills will be cleaned up. Oil and grease will be cleaned from walking surfaces.</p>
Hazard Communication	Comply with the Hazard Communication Standard informing worker about the chemical to which they may be exposed; referenced in 29 CFR 1926 and CH2M HILL SOP HS-05	<p>Complete an inventory of chemicals brought on site by CCI using the Project-Specific Chemical Hazard Communication Form provided in Attachment 2.</p> <p>Confirm inventory of chemicals brought on site by CCI subcontractors is available.</p> <p>Confirm locations of Material Safety Data Sheets ( MSDSs) from client, contractors, and subcontractors for chemicals to which CCI employees potentially are exposed.</p> <p>Before or as the chemicals arrive onsite, obtain an MSDS for each hazardous chemical.</p> <p>Label chemical containers with identity of chemical and hazard warnings, store properly.</p> <p>Give employees required chemical-specific HAZCOM training using the Chemical-Specific Tracking Form provided in Attachment 3.</p>
<b>Physical Conditions</b>		
Buried utilities, drums, tanks	Reduce risk of contacting buried utilities, drums, or tanks during excavations	<p>Contact local utility locator service or Base utilities service before excavations .</p> <p>Perform testing to locate buried tanks, drums or pipelines such as magnetometer or ground penetrating radar survey before excavation.</p>
Drilling	Reduce the hazards from drilling operations; referenced in CH2M HILL SOP HS-35	<p>Only authorized personnel are permitted to operate drill rigs.</p> <p>Stay clear of areas surrounding drill rigs during every startup.</p> <p>Stay clear of the rotating augers and other rotating components of drill rigs.</p> <p>Stay clear of hoisting operations. Loads will not be hoisted overhead of personnel.</p> <p>Do not wear loose-fitting clothing or items such as rings or watches that could get caught in moving parts. Long hair should be restrained.</p>

**TABLE 2-3**

Recommended Safety Controls for Areas C and D

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
		<p>If equipment becomes electrically energized, personnel will be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party will be contacted to have line de-energized prior to approaching the equipment.</p> <p>Smoking around drilling operations is prohibited.</p>
Energized Electrical	Reduce the hazards when dealing with energized electrical circuits; referenced in 29 CFR 1926.400 and CH2M HILL SOP-23	<p>Only qualified personnel permitted to work on unprotected energized electrical systems.</p> <p>Electrical wiring and equipment will be de-energized prior to conducting work unless it can be demonstrated that de-energizing introduces additional or increased hazards or is unfeasible due to equipment design or operational limitations.</p> <p>Electrical systems will be considered energized until lockout/ tagout procedures are implemented.</p>
Fire Protection	To reduce the incidents of fires and provide resources to fight fires; referenced in 29 CFR 1926.150 and CH2M HILL SOP-22	<p>Fire extinguishers will be provided so travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must: 1) be maintained in a fully charged and operable condition, 2) be visually inspected each month, and 3) undergo a maintenance check each year.</p> <p>The area in front of extinguishers must be kept clear.</p> <p>Post “ Exit” signs over exiting doors, “ Fire Extinguisher” signs over extinguisher locations.</p> <p>Combustible materials stored outside should be at least 10 feet from any building.</p> <p>Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.</p> <p>Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.</p>
Manual Lifting	Reduce hazards encountered when lifting loads; referenced in CH2M HILL SOP HS-29	<p>Proper lifting techniques must be used when lifting any object.</p> <p>Plan storage and staging to minimize lifting or carrying distances.</p> <p>Split heavy loads into smaller loads.</p> <p>Use mechanical lifting aids whenever possible.</p> <p>Have someone assist with the lift especially for heavy or awkward loads.</p> <p>Ensure that the path of travel is clear prior to the lift.</p>
Noise	Reduce the exposure to noise; referenced in 29 CFR 1926.101 and 29CFR 1910.95, and CH2M HILL SOP HS-39	<p>Noise areas will be evaluated at the start of the project and at any time new machinery is added to the process.</p> <p>Hearing protection will be worn whenever levels in excess of 85 dBA are exceeded as in areas where you must raise your voice to communicate at a distance of 3 feet or less.</p> <p>Personnel will be trained in the proper installation techniques for ear protection that fits in the ear canal.</p>

**TABLE 2-3**

Recommended Safety Controls for Areas C and D

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
		<p>Hearing protective devices will be kept clean and sanitary between uses.</p> <p>Noise measurements may be required by the SSHA to determine protection areas. These areas need to be posted with appropriate warning signs.</p>
<p>Traffic Control</p>	<p>Reduce accidents related to control of traffic and impacts; referenced in CH2M HILL SOP HS-24</p>	<p>Exercise caution when exiting traveled way or parking along street; avoid sudden stops, use flashers, etc.</p> <p>Park in a manner that will allow for safe exit from vehicle, and where practicable, park vehicle so that it can serve as a barrier.</p> <p>All staff working adjacent to traveled way or within work area must wear reflective/high-visibility safety vests.</p> <p>Eye protection should be worn to protect from flying debris.</p> <p>Remain aware of factors that influence traffic related hazards and required controls – sun glare, rain, wind, flash flooding, limited sight-distance, hills, curves, guardrails, width of shoulder (i.e., breakdown lane), etc.</p> <p>Always remain aware of an escape route – behind an established barrier, parked vehicle, guardrail, etc.</p> <p>Always pay attention to moving traffic – never assume drivers are looking out for you</p> <p>Work as far from traveled way as possible to avoid creating confusion for drivers. .</p>

**TABLE 2-4**

Recommended Safety Controls for PSC 16

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
General Hazards	Reduce general safety hazards found at most sites; referenced in CH2M HILL SOP HS-20	<p>Site work will be performed during daylight hours whenever possible. Work conducted during hours of darkness will require enough illumination intensity to read a newspaper without difficulty.</p> <p>Hearing protection worn in areas where you need to shout to hear someone within 3 feet.</p> <p>Good housekeeping must be maintained at all times in project work areas.</p> <p>Common paths of travel established and kept free from accumulation of materials.</p> <p>Provide slip-resistant surfaces, ropes, and /or other devices to be used.</p> <p>Specific areas should be designated for the proper storage of materials.</p> <p>Tools, equipment, materials, and supplies will be stored in an orderly manner.</p> <p>As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.</p> <p>Containers should be provided for collecting trash and other debris and will be removed at regular intervals.</p> <p>Spills will be cleaned up. Oil and grease will be cleaned from walking surfaces.</p>
Hazard Communication	Comply with the Hazard Communication Standard informing worker about the chemical to which they may be exposed; referenced in 29 CFR 1926 and CH2M HILL SOP HS-05	<p>Complete an inventory of chemicals brought on site by CCI using the Project-Specific Chemical Hazard Communication Form provided in Attachment 2.</p> <p>Confirm inventory of chemicals brought on site by CCI subcontractors is available.</p> <p>Confirm locations of Material Safety Data Sheets (MSDSs) from client, contractors, and subcontractors for chemicals to which CCI employees potentially are exposed.</p> <p>Before or as the chemicals arrive onsite, obtain an MSDS for each hazardous chemical.</p> <p>Label chemical containers with identity of chemical and hazard warnings, store properly.</p> <p>Give employees required chemical-specific HAZCOM training using the Chemical-Specific Tracking Form provided in Attachment 3.</p>

**TABLE 2-4**

Recommended Safety Controls for PSC 16

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
<b>Physical Conditions</b>		
Fire Protection	To reduce the incidents of fires and provide resources to fight fires; referenced in 29 CFR 1926.150 and CH2M HILL SOP-22	<p>Fire extinguishers will be provided so travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must: 1) be maintained in a fully charged and operable condition, 2) be visually inspected each month, and 3) undergo a maintenance check each year.</p> <p>The area in front of extinguishers must be kept clear.</p> <p>Post “ Exit” signs over exiting doors, and post “ Fire Extinguisher” signs over extinguisher locations.</p> <p>Combustible materials stored outside should be at least 10 feet from any building.</p> <p>Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.</p> <p>Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.</p>
Manual Lifting	Reduce hazards encountered when lifting loads; referenced in CH2M HILL SOP HS-29	<p>Proper lifting techniques must be used when lifting any object.</p> <p>Plan storage and staging to minimize lifting or carrying distances.</p> <p>Split heavy loads into smaller loads.</p> <p>Use mechanical lifting aids whenever possible.</p> <p>Have someone assist with the lift especially for heavy or awkward loads.</p> <p>Ensure that the path of travel is clear prior to the lift.</p>
Noise	Reduce the exposure to noise; referenced in 29 CFR 1926.101 and 29CFR 1910.95, and CH2M HILL SOP HS-39	<p>Noise areas will be evaluated at the start of the project and at any time new machinery is added to the process.</p> <p>Hearing protection will be worn whenever levels in excess of 85 dBA are exceeded as in areas where you must raise your voice to communicate at a distance of 3 feet or less.</p> <p>Personnel will be trained in the proper installation techniques for ear protection that fits in the ear canal.</p> <p>Hearing protective devices will be kept clean and sanitary between uses.</p> <p>Noise measurements may be required by the SSHS to determine protection areas. These areas need to be posted with appropriate warning signs.</p>

**TABLE 2-4**

Recommended Safety Controls for PSC 16

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Working Near Water	Reduce accidents that occur working near water; referenced in 29 CFR 1926.106	<p>U.S. Coast Guard-approved personal flotation devices ( PFDs), or life jackets, provided for each employee will be worn.</p> <p>PFDs will be inspected before and after each use. Defective equipment will not be used.</p> <p>Sampling and other equipment will be used according to manufacturers' instructions.</p> <p>A minimum of one life-saving skiff will be provided for emergency use.</p> <p>A minimum of one ring buoy with 90 feet of 3/8-inch solid-braided polypropylene (or equal) rope will be provided for emergency use.</p>
Working Over Water	Reduce accidents that occur working over water; referenced in 29 CFE 1926.106	<p>Safe means of boarding or leaving a boat or platform will be provided to prevent slipping or falling.</p> <p>Boat/barge must be equipped with adequate railing.</p> <p>Employees should be instructed on safe use of water vehicle.</p> <p>Work requiring use of a boat will not take place at night or during inclement weather.</p> <p>The boat/barge must be operated according to U.S. Coast Guard regulations (speed, lighting, right-of-way, etc.)</p> <p>The engine should be shut off before refueling; do not smoke while refueling.</p>

**TABLE 2-5**  
Equipment Inspection and Training Requirements for Areas C and D

Equipment To Be Used	Inspection Requirements	Training Requirements
<p>Drill Rig HS-27</p>	<p>Maintain safe distance from operating equipment and stay alert of equipment movement. Avoid positioning between fixed objects and operating equipment and equipment pinch points, remain outside of equipment swing/turning radius. Pay attention to backup alarms, but not rely on them for protection. Never turn your back on operating equipment.</p> <p>Approach operating equipment only after receiving the operator' s attention. The operator will acknowledge your presence and stop movement of the equipment. Caution will be used when standing next to idle equipment; when equipment is placed in gear. Never approach operating equipment from the side or rear where the operator' s vision is compromised.</p> <p>When required to work in proximity to operating equipment, wear high-visibility vests to increase visibility to equipment operators. For work performed after daylight hours, vests will be made of reflective material or include a reflective stripe or panel.</p> <p>If equipment becomes electrically energized, personnel will be instructed not to touch any part of the equipment or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party will be contacted to have line de-energized prior to approaching the equipment.</p>	<p>Only authorized and trained personnel are permitted to operate earthmoving equipment.</p>
<p>Motor Vehicles (Off highway job site) HS-47</p>	<p>All vehicles will have working safety equipment including: two headlights, brake lights, audible warning device, and a reverse signal audible above surrounding noise levels.</p> <p>Cabs shall be equipped with windshields and powered wipers.</p> <p>All vehicles in use will be inspected at the beginning of each shift and a CCI Heavy Equipment Checklist completed (or the subcontractor' s equivalent document.)</p>	<p>Only state licensed personnel may operate company vehicles.</p>

**TABLE 2-6**  
Equipment Inspection and Training Requirements for PSC 16

Equipment To Be Used	Inspection Requirements	Training Requirements
Motor Vehicles (Off highway job site) HS-47	<p>All vehicles will have working safety equipment including: two headlights, brake lights, audible warning device, and a reverse signal audible above surrounding noise levels.</p> <p>Cabs shall be equipped with windshields and powered wipers.</p> <p>All vehicles in use will be inspected at the beginning of each shift and a CCI Heavy Equipment Checklist completed (or the subcontractor's equivalent document.)</p>	Only state licensed personnel may operate company vehicles.
Crane or Other Lifting Devices, HS-44	<p>Maintain safe distance from operating cranes and stay alert of crane movement. Avoid positioning between fixed objects and operating cranes and crane pinch points, remain outside of crane swing and turning radius. Never turn your back on operating cranes.</p> <p>Approach cranes only after receiving the operator's attention. The operator will acknowledge your presence and stop movement of the crane. Never approach operating cranes from the side or rear where the operator's vision is compromised.</p> <p>When required to work in proximity to operating cranes, wear high-visibility vests to increase visibility to operators. For work performed after daylight hours, vests will be made of reflective material or include a reflective stripe or panel.</p> <p>Stay clear of all hoisting operations. Loads will not be hoisted overhead of personnel.</p> <p>Cranes will not be used to lift or lower personnel.</p> <p>If crane becomes electrically energized, personnel will be instructed not to touch any part of the crane or attempt to touch any person who may be in contact with the electrical current. The utility company or appropriate party will be contacted to have line de-energized prior to approaching the crane.</p> <p>Do not exceed hoist load limits.</p> <p>Ensure load is level and stable before hoisting</p> <p>Inspect all rigging equipment prior to use. Do not use defective rigging for any reason.</p> <p>Only use rigging equipment for the purpose it was designed and intended</p> <p>Stay clear of all hoisting operations. Loads will not be hoisted overhead of personnel.</p> <p>Hoists will not be used to lift or lower personnel.</p> <p>Do not exceed hoist load limits.</p> <p>Ensure load is level and stable before hoisting</p> <p>Inspect all rigging equipment prior to use. Do not use defective rigging for any reason.</p> <p>Only use rigging equipment for the purpose it was designed and intended.</p>	Only certified crane operators are permitted to operate cranes..

## 3.0 Hazard Evaluation and Control\*

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### 3.1 Heat and Cold Stress

*Reference CH2M HILL SOP HS-09, Heat and Cold Stress*

#### 3.1.1 Preventing Heat Stress

The following guidelines relate to heat stress prevention:

- Drink 16 ounces of water before beginning work, such as in the morning or after lunch. Disposable (e.g., 4-ounce) cups and water maintained at 50 to 60 degrees Fahrenheit (°F) should be available. Under severe conditions, drink one to two cups every 20 minutes, for a total of 1 to 2 gallons per day. Take regular breaks in a cool, preferably air-conditioned, area. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours. Monitor for signs of heat stress.
- Acclimate to site work conditions by slowly increasing workloads; e.g., do not begin site work with extremely demanding activities.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. The devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- During hot weather, conduct field activities in the early morning or evening if possible.
- Provide adequate shelter to protect personnel against radiant heat (sun, flames, hot metal), which can decrease physical efficiency and increase the probability of heat stress.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequently changing clothing and by showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.

### 3.1.2 Symptoms and Treatment of Heat Stress

The symptoms of heat stress are listed in Table 3-1.

**TABLE 3-1**  
Symptoms and Treatment of Heat Stress

	<b>Heat Syncope</b>	<b>Heat Rash (<i>miliaria rubra</i>, "prickly heat")</b>	<b>Heat Cramps</b>	<b>Heat Exhaustion</b>	<b>Heat Stroke</b>
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool—but not cold—water. Call ambulance, and get medical attention immediately!

### 3.1.3 Heat-Stress Monitoring

For field activities part of ongoing site work activities in hot weather, the following procedures should be used to monitor the body's physiological response to heat and to estimate the work-cycle/rest-cycle when workers are performing moderate levels of work. These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (greater than 50 percent), or when the workers exhibit symptoms of heat stress.

The heart rate (HR) should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats per minute, or 20 beats per minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 110 beats per minute, or 20 beats per minute above resting pulse.

### 3.1.4 Preventing Cold Stress

The following guidelines relate to cold stress prevention:

- Be aware of the symptoms of cold-related disorders, and *wear proper clothing for the anticipated fieldwork*.
- Consider monitoring the work conditions and adjusting the work schedule, using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- **Wind-Chill Index.** This measure relates the dry bulb temperature and the wind velocity. It is used only to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index sometimes is limited in its usefulness because the index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it is used only as a guideline to warn workers when they are in a situation that can cause cold-related illnesses. Used in conjunction with the NSC guidelines, the wind-chill index provides a starting point for adjusting work and warm-up schedules.
- **NSC Guidelines for Work and Warm-Up Schedules.** The cold-exposure limits recommended by the NSC can be used in conjunction with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; *workers should be monitored for symptoms of cold-related illness*. If symptoms are not observed, the work duration can be increased.
- The wind-chill index and the NSC guidelines are in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual, SOP HS-09*.

### 3.1.5 Symptoms and Treatment of Cold Stress

The symptoms and treatment of cold stress are listed in Table 3-2.

TABLE 3-2  
Symptoms and Treatment of Cold Stress

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Rewarm area quickly in warm—but <b>not</b> hot—water. Have victim drink warm fluids, but <b>not</b> coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but <b>not</b> coffee or alcohol. Get medical attention.

## 3.2 Locating Buried Utilities

### 3.2.1 Local Utility Mark-Out Service

The Base Civil Engineer will be responsible for marking utilities.

### 3.2.2 Procedures for Locating Buried Utilities

Procedures for locating buried utilities are listed as follows:

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural-gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary, clear locations with a utility-locating instrument (e.g., metal detector).
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually. Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SHSS should confirm that arrangement.

## 3.3 Biological Hazards and Controls

Biological hazards and controls are listed in Table 3-3.

TABLE 3-3  
Biological Hazards and Controls

Hazard and Location	Control Measures
<b>Snakes</b> typically are found in underbrush and tall grassy areas.	If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. <b>DO NOT</b> apply ice, cut the wound, or apply a tourniquet. Carry the victim or have him/her walk slowly if the victim must be moved. Try to identify the type of snake: note color, size, patterns, and markings.
<b>Poison ivy, poison oak, and poison sumac</b> typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas.	Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.
Exposure to <b>bloodborne pathogens</b> may occur when rendering first aid/CPR, when coming into contact with medical or other potentially infectious material, or coming into contact with landfill waste or waste streams containing infectious material.	Training is required before a task involving potential exposure is performed. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS -36, <i>Bloodborne Pathogens</i> . Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

**TABLE 3-3**  
Biological Hazards and Controls

<b>Hazard and Location</b>	<b>Control Measures</b>
<b>Bees and other stinging insects</b> may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.	Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SHSS and/or the buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.
<b>Other potential biological hazards</b>	None anticipated.

## 3.4 Tick Bites

*Reference CH2M HILL HS-03, Tick Bites*

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size.

**Prevention** against tick bites includes avoiding tick areas; wearing tightly woven light-colored clothing with long sleeves and wearing pant legs tucked into boots or socks; spraying **only outside** of clothing with insect repellent containing permethrin or permanone, and spraying skin with DEET; and checking yourself frequently for ticks and showering as soon as possible. To prevent chemical repellents from interfering with sample analyses, exercise care while using repellents during the collection and handling of environmental samples.

**If bitten** by a tick, carefully remove the tick with tweezers, grasping the tick as close as possible to the point of attachment while being careful not to crush the tick. After removing the tick, wash your hands and disinfect and press the bite area. The removed tick should be saved. Report the bite to human resources personnel.

Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF): Lyme - a rash that looks like a bullseye with a small welt in the center; RMSF - a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, bone pain may develop. If symptoms appear, seek medical attention.

## 3.5 Radiological Hazards and Controls

Refer to CH2M HILL's Corporate Health and Safety Program, Program and Training Manual, and Corporate Health and Safety Program, Radiation Protection Program Manual, for standards of practice for operating in contaminated areas. There are no known radiological hazards associated with this project.

## 3.6 Hazards Posed by Chemicals Brought on the Site

### 3.6.1 Hazard Communication

*Reference CH2M HILL Hazard Communication Manual*

CH2M HILL's *Hazard Communication Program Manual*, which is available from area or regional offices and from the Corporate Human Resources Department in Denver,

Colorado. The project manager is to request MSDSs from the client or from the contractors and the subcontractors for chemicals to which CCI employees potentially are exposed. The SHSS is to do the following:

- Give employees required site-specific hazard communication (HAZCOM) training.
- Confirm that inventory of chemicals brought on the site by subcontractors is available.
- Before or as chemicals arrive on the site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with identity of chemical and with hazard warnings, if any.

Chemical products listed in Table 3-4 will be used on site. Refer to Attachment 2 for MSDSs.

**TABLE 3-4**  
Chemical Hazards

Chemical	Quantity	Location
Methane (calibration gas)	1 liter, compressed gas	Support Zone
Hydrogen (Fuel Gas for FID)	1 Cylinder	Support Zone
Hydrochloric Acid (sample preservation)	1 liter, corrosive	Support Zone
Nitric Acid (sample preservation)	1 liter, corrosive	Support Zone
Sulfuric Acid (sample preservation)	1 liter, corrosive	Support Zone
Sodium Hydroxide (sample preservation)	1 liter, corrosive	Support Zone
Methanol (decontamination)	4 liters, flammable	Support/Decontamination Zone
Hexane (decontamination)	4 liters, flammable	Support/Decontamination Zone
Alconox/ Liquinox (detergent)	< 1 liter, powder/liquid	Support/Decontamination Zone

### 3.6.2 Shipping and Transportation of Chemical Products

*Reference CH2M HILL's Procedures for Shipping and Transporting Dangerous Goods*

Nearly all chemicals brought to the site are considered hazardous materials by the DOT. All staff who ship the materials or transport them by road must receive the CH2M HILL training in shipping dangerous goods. Hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

## 3.7 Contaminants of Concern

*Reference Project Files for More-Detailed Contaminant Information*

Contaminants of concern are listed in Table 3-5.

## 3.8 Potential Routes of Exposure

Potential routes of exposure include:

- **Dermal:** Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 5.0.

- **Inhalation:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in Sections 5.0 and 6.0, respectively.
- **Other:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before eating, drinking, or smoking).

**TABLE 3-5**  
Contaminants of Concern

Contaminant	Location and Maximum Concentration (ppm) <sup>a</sup>	Exposure Limit <sup>b</sup>	IDLH <sup>c</sup>	Symptoms and Effects of Exposure	PIP <sup>d</sup> (eV)
<b>AREA C</b>					
Methylene Chloride	GW: 27 ug/l	25 ppm	2,300 ppm CA	Irritation eyes, skin; fatigue; weakness; light-headed; numb tingle limbs; nausea; carcinogen	11.32
Trichloroethylene	GW: 5,000 ug/l	50 ppm	1,000 ppm, Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	11.00
<b>AREA D</b>					
Arsenic	GW: 23 ug/l	0.01 mg/m <sup>3</sup>	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
1,2-Dichloroethylene	GW: 190 ug/l	200 ppm	1,000 ppm	Irritation eyes, respiratory system; CNS depression	9.65
Methylene Chloride	GW: 11.25 ug/l	25 ppm	2,300 ppm	Irritation eyes, skin; fatigue; weakness; light-headed; numb tingle limbs; nausea; carcinogen	11.32
Tetrachloroethylene (PCE)	GW: 34ug/l	25 ppm	150 ppm CA	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
Trichloroethylene (TCE)	GW: 6,800 ug/l	50 ppm	1,000 ppm CA	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
<b>PSC 16</b>					
Lead	SL: 139 mg/kg	0.05mg/m <sup>3</sup>	100mg/m <sup>3</sup>	Weakness, lassitude, insomnia, facial pallor, anorexia, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, wrist drop, paralysis ankle, wrist; kidney disease; irritation eyes; hypotension	NA
PNAs (Limits as Coal Tar Pitch)	SL: 660ug/kg	02 mg/m <sup>3</sup>	80 Ca	Dermatitis and bronchitis	UK

Footnotes:

<sup>a</sup> Specify sample-designation and media: GW (Groundwater), L (Lagoon), TK (Tank), S (Surface Soil), SL (Sludge), SW (Surface Water).

<sup>b</sup> Appropriate value of PEL, REL, or TLV listed.

<sup>c</sup> IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen.

<sup>d</sup> PIP = photoionization potential; NA = Not applicable; UK = Unknown.

Ppm = parts per million

Mg/m<sup>3</sup> = milligram per cubic meter

EV – electron volt

# 4.0 Personnel

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## 4.1 CCI Employee Medical Surveillance and Training

*Reference CH2M HILL SOP HS-01, Medical Surveillance, and HS-02, Health and Safety Training*

The employees listed in Table 4-1 are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SHSS" have received 8 hours of supervisor and instrument training and can serve as SHSS for the level of protection indicated. An SHSS with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones that involve the potential for exposure to health and safety hazards. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and cardiopulmonary resuscitation (CPR). At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones that involve the potential for exposure to health and safety hazards. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities, before being assigned fieldwork.

**TABLE 4-1**  
Project Personnel Safety Certifications

Employee Name	Office	Responsibility	SHSS/FA-CPR
Mike Halil/J.A. Jones		Project Manager	
TBD		Site Superintendent	
Jose Melendez/ J.A. Jones		SHSS	SSC-Level C, FA-CPR
Eric Burrell	ATL	Project QC Manager	SC-HW SHSS; FA-CPR
Robert Nash	ATL	H&S Manager	SC-HW/C SHSS; FA-CPR

## 4.2 Field Team Chain of Command and Communication Procedures

### 4.2.1 Client

**Contact Name:** Eva Clement, Southern Division, NAVFAC

## 4.2.2 CCI

**Project Manager:** Mike Halil/ J.A. Jones

**Health and Safety Manager:** Robert Nash

**Site Superintendent:** TBD

**Site Health and Safety Specialist:** Jose Melendez/J.A. Jones

The SHSS is responsible for contacting the site superintendent and the project manager. In general, the project manager either will contact or will identify the client contact. The HSM should be contacted as appropriate. The SHSS or the project manager must notify the client and the HSM when a serious injury or a death occurs or when health and safety inspections by OSHA or other agencies are conducted. Refer to Sections 10 through 12 for emergency procedures and phone numbers.

## 4.2.3 Subcontractors

*Reference Section 3, Corporate Health and Safety Program Manual*

When specified in the project documents (e.g., contract), this plan may cover CCI subcontractors. However, this plan does not address hazards associated with tasks and equipment that the subcontractor has expertise in (e.g., operation of drill rig). Specialty subcontractors are responsible for health and safety procedures and plans specific to their work. Specialty subcontractors are to submit plans to CCI for review and approval before the start of fieldwork. Subcontractors must comply with the established health and safety plan(s). CCI must monitor and enforce compliance with the established plan(s).

General health and safety communication with subcontractors contracted with CCI and covered by this plan is to be conducted as follows:

- Request that the subcontractor, if a specialty subcontractor, submit a safety or health plan applicable to their expertise (e.g., drill-rig safety plan or nuclear density gauge [NDG] health plan); attach the reviewed plan.
- Supply subcontractors with a copy of this plan, and brief them on its provisions.
- Direct health and safety communication to the subcontractor-designated safety representative.
- Notify the subcontractor-designated representative if a violation of the plan(s) is observed. Specialty subcontractors are responsible for mitigating hazards in which they have expertise.
- If a hazard condition persists, inform the subcontractor. If the hazard is not mitigated, stop affected work as a last resort and notify the project manager.
- When an apparent imminent danger exists, promptly remove all affected personnel. Notify the project manager.
- Make clear that consistent violations of the health and safety plan by a subcontractor may result in termination of the subcontract.

# 5.0 Personal Protective Equipment

Reference CH2MHILL SOP HS-07, Personal Protective Equipment; HS-08, Respiratory Protection

## 5.1 PPE Specification

TABLE 5-1  
PPE Specifications<sup>a</sup>

Task	Level	Body	Head	Respirator <sup>b</sup>
General work uniform when no chemical exposure is anticipated	D	Work clothes; steel-toe, steel-shank leather work boots; work gloves	Hardhat <sup>c</sup> Safety glasses Ear protection <sup>d</sup>	None required
Hydopunch, Sampling	Modified D	<b>COVERALLS:</b> Uncoated Tyvek® <b>BOOTS:</b> Steel-toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers, hip waders, Personal Flotation Device (PFD) for water activities <b>GLOVES:</b> Inner surgical nitrile glove & outer leather or arimid-fiber glove.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> Safety glasses Ear protection <sup>d</sup>	None required
<b>NOT APPROVED FOR THIS ACTIVITY</b>	C	<b>COVERALLS:</b> Polycoated Tyvek® <b>BOOTS:</b> Steel-toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers <b>GLOVES:</b> Inner surgical-style AND outer chemical-resistant nitrile glove.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> Ear protection <sup>d</sup> Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H <sup>e</sup> cartridges or equivalent
<b>NOT APPROVED FOR THIS ACTIVITY</b>	B	<b>COVERALLS:</b> Polycoated Tyvek® <b>BOOTS:</b> Steel toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers <b>GLOVES:</b> Inner surgical-style AND outer chemical-resistant nitrile glove.	Hardhat <sup>c</sup> Splash shield <sup>c</sup> Ear protection <sup>d</sup> Spectacle inserts	Pressure demand self-contained breathing apparatus (SCBA)

<sup>a</sup> Modifications are as indicated. CCI will provide PPE to only CCI employees.

<sup>b</sup> No facial hair that would interfere with respirator fit is permitted.

<sup>c</sup> Hardhat and splash-shield areas are to be determined by the SHSS.

<sup>d</sup> Ear protection will be worn while around drill rigs or noise-producing equipment or when conversations cannot be held at distances of 3 feet or less without shouting.

<sup>e</sup> The GME-H cartridge is the new standard-issue cartridge. Available stock of the previously standard GMC-H cartridges may be used for tasks covered by this plan.

## 5.2 Upgrading or Downgrading Level of Protection

The reasons for upgrading or downgrading the PPE level are as follows:

- Upgrade
  - Request from individual performing task
  - Change in work that increase contact/potential contact with hazardous materials
  - Occurrence or likely occurrence of gas or vapor emission
  - Known or suspected presence of dermal hazards
  - Instrument action levels (Section 6) exceeded
- Downgrade
  - New information indicating that situation is less hazardous than originally thought

- Change in site conditions that decreases the hazard
- Change in work task that will reduce contact with hazardous materials

Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been specified in Section 5.0 and an SHSS who meets the requirements specified in Section 4.1 is present.

# 6.0 Air Monitoring Specifications

Reference CH2M HILL SOP HS-06, Air Monitoring

Air monitoring specifications are listed in Table 6-1.

**TABLE 6-1**  
Air Monitoring Specifications

Instrument	Action Levels <sup>a</sup>	Frequency <sup>b</sup>	Calibration
FID OVA model 128 or equivalent Area C & D Activities	0 – 25 ppm – Level D >25 ppm – Stop Work	Initially and periodically during task	Daily

<sup>a</sup> Action levels apply to sustained breathing-zone measurements above background.

<sup>b</sup> The exact frequency of monitoring depends on field conditions and is to be determined by the SHSS; generally, every 5 to 15 minutes is acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time and measurement result, personnel monitored, and place/location where measurement is taken (e.g., “ Breathing Zone/MW-3,” “ at surface/SB-2,” etc.).

ppm = parts per million

**Action Levels will be established in Site Specific HSP, when concentrations for Contaminants of Concern are evaluated.**

## 6.1 Calibration Specifications

Calibration specifications are listed in Table 6-2. Refer to the respective manufacturer’s instructions for proper instrument-maintenance procedures.

**TABLE 6-2**  
Calibration Specifications

Instrument	Calibration Gas	Span	Reading	Method
FID: TVA 1000	100 ppm methane	NA	100 ppm	2.5 lpm reg T-tubing

ppm = parts per million

## 6.2 Air Sampling

Sampling may be required by other OSHA regulations where exposure to certain contaminants may exist. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

### 6.2.1 Method Description

Real time air monitoring will be performed. Contact HSM if assistance is required.

## **6.2.2 Personnel and Areas**

Results must be sent immediately to the HSM. Regulations may require reporting to monitored personnel. Results reported to: HSM: Robert Nash/ATL.

# 7.0 Decontamination

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Reference CH2M HILL SOP HS-13, Decontamination

The SHSS must monitor the effectiveness of the decontamination procedures. Decontamination procedures found to be ineffective will be modified by the SHSS.

## 7.1 Decontamination Specifications

Decontamination specifications are listed in Table 7-1.

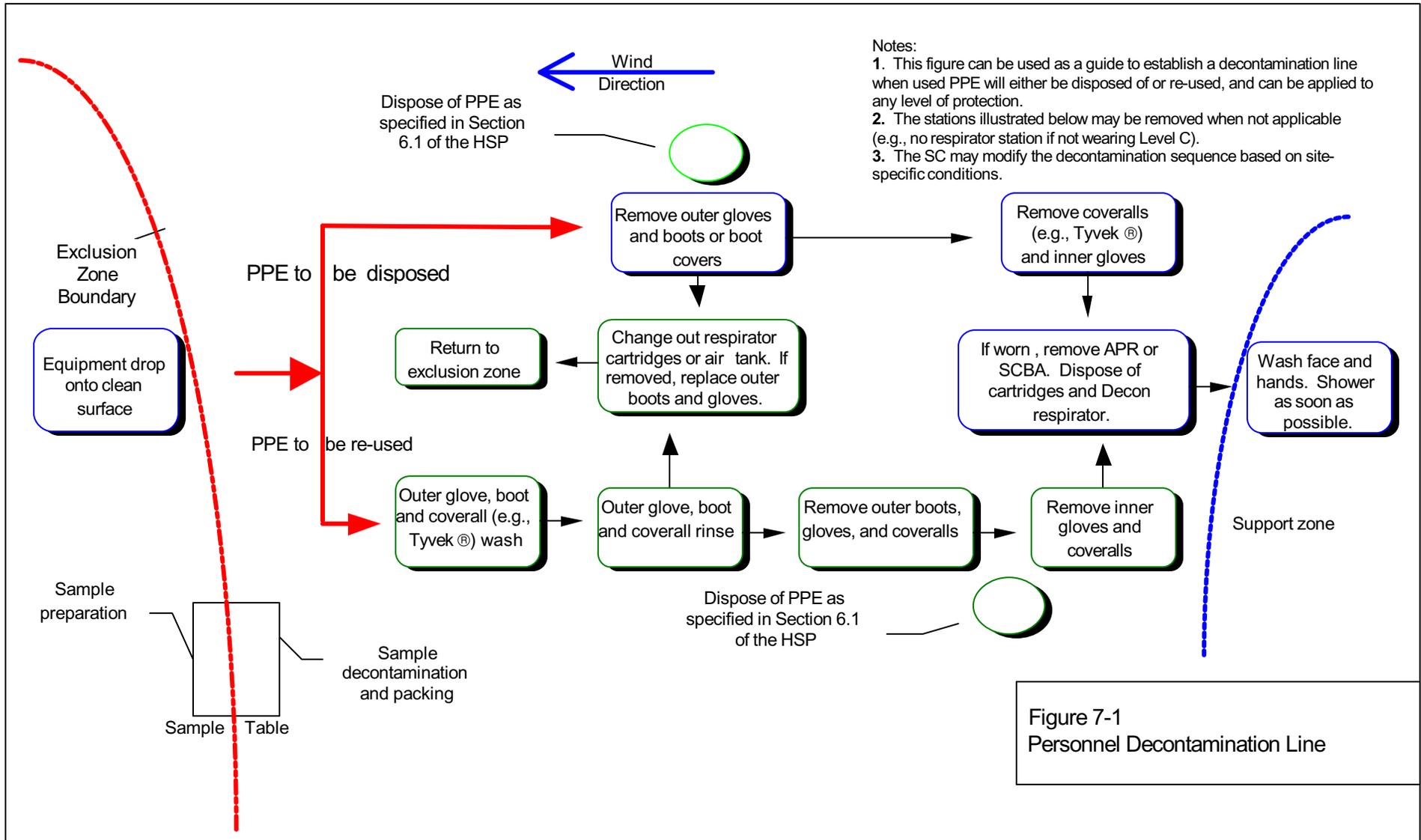
TABLE 7-1  
Decontamination Specifications

Personnel	Sample Equipment	Heavy Equipment
<ul style="list-style-type: none"><li>• Boot wash/rinse</li><li>• Glove wash/rinse</li><li>• Body-suit removal</li><li>• Hand wash/rinse</li><li>• Face wash/rinse</li><li>• Shower ASAP</li><li>• <b>PPE-disposal method</b> Dispose in drums</li><li>• <b>Water-disposal method</b> Dispose in drums</li></ul>	<ul style="list-style-type: none"><li>• Wash/rinse equipment</li><li>• Solvent-rinse equipment</li><li>• <b>Solvent-disposal method</b> Dispose in drums</li></ul>	<ul style="list-style-type: none"><li>• Power wash</li><li>• Steam clean</li><li>• <b>Water-disposal method</b> Dispose in drums</li></ul>

## 7.2 Diagram of Personnel-Decontamination Line

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SHSS should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones.

Figure 7-1 illustrates a typical establishment of work zones, including the decontamination line. Work zones are to be modified by the SHSS to accommodate task-specific requirements.



# 8.0 Spill Prevention and Control Plan

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This Spill Prevention and Control Plan establishes minimum site requirements. Subcontractors are responsible for spill prevention and control related to their operations. Subcontractors written spill prevention and control procedures must be consistent with this plan. Spills must be reported to your supervisor, the site manager, and the Contract Manager.

## 8.1 Spill Prevention

Fuel and chemical storage areas will be properly protected from onsite and offsite vehicle traffic. Fuel storage tanks must be equipped with secondary containment. Fuel tanks must be inspected daily for signs of leaks. Accumulated water must be inspected for signs of product before discharge.

Incidental chemical products must be properly stored, transferred, and used in a safe manner. Should chemical product use occur outside areas equipped with spill control materials, adequate spill control materials must be maintained.

## 8.2 Spill Containment and Control

Spill control materials will be maintained in the support zone and at fuel storage and dispensing locations. Incidental spills will be contained with sorbent and disposed of properly. Spilled materials must be immediately contained and controlled. Spill response procedures include:

- Immediately warn any nearby personnel and notify the work supervisor.
- Assess the spill area to ensure that it is safe to approach.
- Activate site evacuation signal if spill presents an emergency.
- Ensure any nearby ignition sources are immediately eliminated.
- If it can be done safely, stop the source of the spill.
- Establish site control for the spill area.
- Use proper PPE in responding to the spill.
- Contain and control spilled material through the use of sorbent booms, pads, or other materials.

## 8.3 Spill Cleanup and Removal

Spilled material, contaminated sorbent, and contaminated media will be cleaned up and removed as soon as possible. Contaminated spill material will be drummed, labeled, and properly stored until material is disposed of. Contaminated material will be disposed of according to applicable federal, state, and local requirements. Contact the regulatory compliance person for the project or the program for assistance.

## 9.0 Confined-Space Entry

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*Reference CH2M HILL SOP HS-17, Confined Space Entry*

Confined-space entry requires health and safety procedures, training, and a permit.

When planned activities include confined-space entry, permit-required confined spaces accessible to CCI personnel are to be identified before the task begins. The SHSS will confirm that permit spaces are properly posted or that employees are informed of their locations and informed of their hazards.

When confined space entry is required, the SSHS will maintain a copy of SOP HS-17 onsite.

# 10.0 Site Control Plan

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## 10.1 Site Control Procedures

The following site control procedures will be implemented for this CTO:

- SHSS will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of health and safety plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies.
- SHSS records attendance at safety briefings in logbook and documents topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location at sites where project field offices, trailers, or equipment storage boxes are established.
- Determine wind direction.
- Establish work zones: support, decontamination, and exclusion zones. Delineate zones with flags or cones as appropriate. The support zone (SZ) should be upwind of the site.
- Establish decontamination procedures, including respirator-decontamination procedures, and test the procedures.
- Use access control at the entry and exit from each work zone.
- Store chemicals in appropriate containers.
- Make MSDSs available for onsite chemicals to which employees are exposed.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the “buddy system.”
- Establish procedures for disposing of material generated on the site.
- Initial air monitoring is conducted by the SHSS in appropriate level of protection.
- SHSS is to conduct periodic inspections of work practices to determine the effectiveness of this plan -- refer to CH2M HILL SOP 18, *Health and Safety Checklist*. Deficiencies are to be noted, reported to the HSM, and corrected.

## 10.2 HAZWOPER Compliance Plan

*Reference CH2M HILL SOP HS-17, Health and Safety Plans*

The following procedures are to be followed when certain activities do not require 24- or 40-hour training. Note that prior approval from the HSM is required before these tasks are conducted on regulated hazardous waste sites.

- Certain parts of the site work may be covered by state or federal HAZWOPER standards and therefore require training and medical monitoring. Anticipated tasks must be included in Section 2.2.1.
- Air sampling must confirm that there is no exposure to gases or vapors before non-HAZWOPER-trained personnel are allowed on the site. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to Sections 3.8 and 6.2 for contaminant data and air sampling requirements, respectively.
- Non-HAZWOPER-trained personnel must be informed of the nature of the existing contamination and its locations, the limits of their access, and the emergency action plan for the site. Non-HAZWOPER-trained personnel also must be trained in accordance with other state and federal OSHA requirements, including 29 CFR 1910.1200 (HAZCOM). Refer to Section 3.7.1 for hazard communication requirements.
- Air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-HAZWOPER-trained personnel (e.g., in an adjacent area) are not exposed to volatile contaminants. Non-HAZWOPER-trained personnel should be monitored whenever the belief is that there may be a possibility of exposure (e.g., change in site conditions), or at some reasonable frequency to confirm that there is no exposure. Refer to Section 6.1 for air monitoring requirements.

If HAZWOPER-regulated tasks are conducted concurrently with nonregulated tasks, non-HAZWOPER-trained subcontractors must be removed from areas of exposure. If non-HAZWOPER-trained personnel remain on the site while a HAZWOPER-regulated task is conducted, the contaminant/exposure area (exclusion zone) must be posted, non-HAZWOPER-trained personnel must be reminded of the locations of restricted areas and the limits of their access, and real-time monitoring must be conducted. Non-HAZWOPER-trained personnel at risk of exposure must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.

# 11.0 Emergency Response Plan

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*Reference CH2M HILL SOP HS-12, Emergency Response*

## 11.1 Pre-Emergency Planning

SHSS performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Locate the nearest telephone; determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Identify and communicate chemical, safety, radiological, and biological hazards.
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Post site map marked with locations of emergency equipment and supplies, and post OSHA job-site poster. The OSHA job-site poster is required at sites where project field offices, trailers, or equipment-storage boxes are established.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Evaluate capabilities of local response teams where applicable.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, chemical and vapor releases.
- Review notification procedures for contacting CCI's medical consultant and team member's occupational physician.
- Rehearse the emergency response plan once before site activities begin, including driving the route to the hospital.
- Brief new workers on the emergency response plan.

- The SHSS will evaluate emergency response actions and initiate appropriate follow-up actions.

## 11.2 Emergency Equipment and Supplies

The SHSS should mark the locations of emergency equipment on the site map and should post the map. Emergency equipment and its location are listed in Table 11-1.

**TABLE 11-1**  
Emergency Equipment

<b>Emergency Equipment and Supplies</b>	<b>Location</b>
20 lb (or two 10-lb) fire extinguisher (A, B, and C classes)	In Field Vehicle
First aid kit	In Field Vehicle
Eye wash	In Field Vehicle
Potable water	In Field Vehicle
Bloodborne-pathogen kit	In Field Vehicle
Additional equipment (specify)	

## 11.3 Emergency Medical Treatment

Emergency medical treatment procedures are as follows:

- Notify emergency response authorities listed in Sections 11.9 and 11.11 (e.g., 911).
- During a time of no emergency, contact CCI's medical consultant for advice and guidance on medical treatment.
- The SHSS will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving/first aid or medical treatment take priority.
- Notify the field team leader and the project manager of the injury.
- Make certain that the injured person is accompanied to the emergency room.
- Notify the Navy RAC Program manager and the Navy RAC health and safety manager. If neither can be contacted, call the SOUTHDIV Field Safety Manager. Contact numbers are listed in Table 11-4. Complete six question initial incident report and sent to PMO.
- Notify the injured person's human resources department within 24 hours.

- Prepare an incident report -- refer to CH2M HILL SOP 12, *Incident Report Form* on Virtual Office. Submit report to corporate director of health and safety, Navy RAC health and safety manager, and corporate human resources department within 24 hours.
- When contacting medical consultant, state that you are calling about a CCI matter, and give your name, telephone number, name of injured person, extent of injury/exposure, and the name and location of the medical facility where the injured person was taken.

## 11.4 Non-emergency Procedures

The procedures listed above may be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CCI medical consultant.

When contacting the medical consultant, state that the situation is a CCI matter, and give your name, your telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken. Follow these procedures as appropriate.

## 11.5 Incident Response

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CCI operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Notify appropriate response personnel.
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

## 11.6 Evacuation

Evacuation procedures are as follows:

- Evacuation routes will be designated by the SHSS before work begins.
- Onsite and offsite assembly points will be designated before work begins.
- Personnel will leave the exclusion zone and assemble at the onsite assembly point upon hearing the emergency signal for evacuation.
- Personnel will assemble at offsite point upon hearing emergency signal for a evacuation.
- SHSS and a "buddy" will remain on the site after the site has been evacuated (if possible) to assist local responders and advise them of the nature and location of the incident.
- SHSS accounts for all personnel in the onsite assembly zone.
- A person designated by the SHSS before work begins will account for personnel at the offsite assembly area.

- The SHSS will write up the incident as soon as possible after it occurs and will submit a report to the corporate director of health and safety.

## 11.7 Evacuation Routes and Assembly Points

Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map posted at the site.

## 11.8 Evacuation Signals

Evacuation signals are listed in Table 11-2.

**TABLE 11-2**  
Evacuation Signals

Signal	Meaning
Grasping throat with hand	Emergency—help me
Thumbs up	OK; understood
Grasping buddy's wrist	Leave area now
Continuous sounding of horn	Emergency; leave site now

## 11.9 Emergency Response Telephone Numbers

Emergency response telephone numbers are listed in Table 11-3.

**TABLE 11-3**  
Emergency Response Telephone Numbers

Site Address:	Phone:
<b>Police:</b> NAS JAX Security	<b>Phone:</b> 911 or 904/542-2661
<b>Fire:</b> NAS JAX Fire Department	<b>Phone:</b> 911 or 904/542-3333
<b>Ambulance:</b> NAS JAX Fire Department	<b>Phone:</b> 911 or 904/542-3333
<b>Hospital:</b> St. Vincent' s Hospital	<b>Phone:</b> 904/387-7300
<b>Address:</b> 1800 Barrs Street, Jacksonville, FL	

\*When using a cellular phone outside the telephone's normal calling area, exercise caution in relying on the cellular phone to activate 911. When the caller is outside the normal calling area, the cellular service carrier should connect the caller with emergency services in the area where the call originated, but this may not occur. Telephone numbers of backup emergency services should be provided if a cellular phone is relied on to activate 911.

<b>Route to Hospital:</b>	From Main Gate, turn RIGHT onto US-17/Roosevelt Blvd	4.3 miles
	Turn RIGHT onto St, Johns Ave	0.4 miles
	Turn LEFT onto Herschel St/FL-211	0.1 miles
	Turn SLIGHT RIGHT onto St. Johns Ave./FL-211	1.8 miles
	Turn LEFT onto King St/FL-211	0.1 miles
	Turn RIGHT onto Riverside Ave./FL-211	0.2 miles
	Turn RIGHT onto Barrs St.	0.1 miles
	Total Distance: 7.5 miles	Travel time: 17 minutes

The hospital location map is provided in Figure 11-1.

**FIGURE 11-1**  
Hospital Map

## 11.10 Government Agencies Involved in Project

**Federal Agency and Contact Name:** Southern Division, NAVFAC

Contact the project manager. Generally, the project manager will contact relevant government agencies.

## 11.11 Emergency Contacts

If an incident occurs, notify the person's personnel office, the Navy RAC **Program Manager**, the Navy RAC **Health and Safety Manager**, and if neither is available contact Southern Division NAVFAC **Field Safety Office**, as soon as possible after obtaining medical attention for the injured person. Notification **MUST** be made within 24 hours of the incident. Notification is for injuries or property damage greater than \$1,000. Emergency contacts listed in Table 11-4.

**TABLE 11-4**  
Emergency Contacts

<p><b>CCI Medical Consultant</b> Dr. Peter P Greany WorkCare Inc.,333 S. Anita Drive Orange, CA 92868,800/455-6155  (After-hours calls will be returned within 20 minutes.)</p>	<p><b>SouthDiv Field Safety</b> Contact: Mr. Fletcher Ballzigler; 843/820-5666 1<sup>st</sup> Alternate: Mr. David Driggers; 843/820-7466 2<sup>nd</sup> Alternate: Ms. Dolores Chester; 843/820-7462</p>
<p><b>CCI Drug-Free Workplace Program Administrator</b> Alicia Sweeney/ORL 407/423-0001</p>	<p><b>Site Safety and Health Specialist (SHSS)</b> Jose Melendez/ J.A. Jones 904/777-4812</p>
<p><b>Navy RAC Program Manager</b> Scott Newman/ATL 770/604-9182, ext. 519; Cel-phone: 678/488-5988</p>	<p><b>Project Manager</b> Mike Hall/ J.A. Jones 904/777-4812</p>
<p><b>Navy RAC Health and Safety Manager (HSM)</b> Robert Nash/ATL 770/604-9182, ext. 341</p>	<p><b>Navy RAC Environmental Compliance Manager</b> Nancy Ballantyne/DEN 303/771-0900 ext. 5561</p>
<p><b>CCI Health and Safety Manager</b> Angelo Liberatore 770/604-9182, ext. 592</p>	<p><b>Human Resources Manager</b> Nancy Orr /DEN 303/771-0925</p>
<p><b>Client</b> Eva Clements Naval Facilities Engineering Command</p>	<p><b>Corporate Human Resources Department</b> Julie Zimmerman/COR 303/771-0900</p>
<p><b>Federal Express Dangerous Goods Shipping</b> 800/238-5355 CH2M HILL Emergency Number for Shipping Dangerous Goods 800/255-3924</p>	<p><b>Worker's Compensation and Auto Claims</b> Sterling Administrative Services 800/420-8926 After hours 800/497 -4566 Report fatalities &amp; report vehicular accidents involving pedestrians, motorcycles, or more than two cars.</p>

# 12.0 Approval

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This site-specific health and safety plan has been written for use by CCI only. CCI claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

## 12.1 Original Plan

Written by:

Date:

Approved by: Robert Nash

Date: April 2001

## 12.2 Revisions

Revisions Made by:

Date:

Revisions Approved by:

Date:

# 13.0 Distribution

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Distribution for this plan is listed in Table 13-1.

**TABLE 13-1**  
Distribution List

<b>Name</b>	<b>Office</b>	<b>Responsibility</b>	<b>Number of Copies</b>
Robert Nash	ATL	Health and Safety Manager/Approver	1
Mike Halil/ J.A. Jones	JAX	Project Manager	1
TBD	JAX	Site Superintendent/Field Team	
Jose Melendez/ J.A. Jones	JAX	Site Safety and Health Specialist	1
Client	NA	Client Project Manager	

# **Attachment 1**

## **Employee Signoff**



## **Attachment 2**

### **Project Specific Chemical Product Hazard Communication Form**

## Project-Specific Chemical Product Hazard Communication Form

This form must be completed prior to performing activities that expose personnel to hazardous chemicals products. Upon completion of this form, the SC will verify that training is provided on the hazards associated with these chemicals and the control measures to be used to prevent exposure to CH2M HILL and subcontractor personnel. Labeling and MSDS systems will also be explained.

**Project Name :** NAS Jacksonville

**Project Number:**

**MSDSs will be maintained  
at the following  
location(s):**

*Hazardous Chemical Products Inventory*

Chemical	Quantity	Location	MSDS Available	Container labels	
				Identity	Hazard
Methane	1 liter, compressed	Support Zone			
Hydrogen	1 Cylinder	Support/ Decon Zones			
Hydrochloric acid	< 500 ml	Support Zone / sample bottles			
Nitric acid	< 500 ml	Support Zone / sample bottles			
Sulfuric Acid	< 500 ml	Support Zone / sample bottles			
Sodium hydroxide	< 500 ml	Support Zone / sample bottles			
Methanol	< 1 Gallon	Support/ Decon Zones			
Hexane	< 1 Gallon	Support/ Decon Zones			
Alconox/ Liquinox	< 1liter	Support/ Decon Zones			

Refer to SOP HS-05 *Hazard Communication* for more detailed information.

## **Attachment 3**

### **Chemical-Specific Training Form**

## CCI CHEMICAL-SPECIFIC TRAINING FORM

Location:	NAS Jacksonville	Project # :	
SSHS:		Trainer:	

### TRAINING PARTICIPANTS:

NAME	SIGNATURE	NAME	SIGNATURE

### REGULATED PRODUCTS/TASKS COVERED BY THIS TRAINING:


The HCC will use the product MSDS to provide the following information concerning each of the products listed above.

- Physical and health hazards
- Control measures that can be used to provide protection (including appropriate work practices, emergency procedures, and personal protective equipment to be used)
- Methods and observations used to detect the presence or release of the regulated product in the workplace (including periodic monitoring, continuous monitoring devices, visual appearance or odor of regulated product when being released, etc.)

Training participants will have the opportunity to ask questions concerning these products and, upon completion of this training, will understand the product hazards and appropriate control measures available for their protection.

Copies of MSDSs, chemical inventories, and CH2M HILL's written hazard communication program will be made available for employee review in the facility/project hazard communication file.

## **Attachment 4**

### **Material Safety Data Sheets**

# Alconox®

## MATERIAL SAFETY DATA SHEET

Alconox, Inc.

9 East 40th Street, Suite 200

New York, NY 10016

### I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 1998
Chemical Family:	Anionic Powdered Detergent

### II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

### III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.

### IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO <sub>2</sub> , foam
Special Firefighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

### V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO <sub>2</sub> on burning

## VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs readminister fluids. See a physician for discomfort.

## VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

### VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

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THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

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BACHARACH -- CALIBRATION GAS, METHANE 500 PPM IN AIR, 51-1816  
MATERIAL SAFETY DATA SHEET  
NSN: 663000N048469  
Manufacturer's CAGE: 05083  
Part No. Indicator: A  
Part Number/Trade Name: CALIBRATION GAS, METHANE 500 PPM IN AIR, 51-1816

=====  
General Information  
=====

Company's Name: BACHARACH INC  
Company's Street: 625 ALPHA DR  
Company's City: PITTSBURGH  
Company's State: PA  
Company's Country: US  
Company's Zip Code: 15238  
Company's Emerg Ph #: 800-424-9300 (CHEMTREC)  
Company's Info Ph #: 412-963-2223  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 13DEC90  
Safety Data Review Date: 17FEB94  
MSDS Serial Number: BTYRS  
Hazard Characteristic Code: NK

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: METHANE. BP:-260F,-162C. MP:-296F,-182C. FL PT:-306F,-188C.  
Ingredient Sequence Number: 01  
Percent: 0.05  
NIOSH (RTECS) Number: PA1490000  
CAS Number: 74-82-8  
OSHA PEL: N/K (FP N)  
ACGIH TLV: ASPHYXIAN

-----  
Proprietary: NO  
Ingredient: AIR, REFRIGERATED LIQUID; (AIR)  
Ingredient Sequence Number: 02  
Percent: 99.95  
NIOSH (RTECS) Number: AX5271000  
OSHA PEL: N/K (FP N)  
ACGIH TLV: N/K (FP N)

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: COLORLESS, ODORLESS, TASTELESS COMPRESSED GAS IN  
CYLINDERS.  
Boiling Point: SEE ING 1  
Melting Point: SEE ING 1  
Vapor Pressure (MM Hg/70 F): (GAS)  
Vapor Density (Air=1): 0.991  
Specific Gravity: 0.673  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
pH: N/A  
=====

Fire and Explosion Hazard Data

Flash Point: SEE ING 1  
Flash Point Method: CC  
Lower Explosive Limit: 5%  
Upper Explosive Limit: 15%  
Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N). THIS GAS IS NOT FLAMMABLE. COOL EXPOSED CONTAINERS W/WATER.  
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N). USE SHIELDING TO PROTECT FROM CYLINDER EXPLOSION.  
Unusual Fire And Expl Hazrds: THIS MIXT IS BELOW LEL OF METHANE & NON-FLAMM. COMPRESSED AIR/METHANE MIXTS AT HIGH PRESS WILL ACCELERATE BURNING OF OTHER MATLS. GAS CYLS EXPOS TO HEAT(SUPDAT)

Reactivity Data

Stability: YES  
Cond To Avoid (Stability): AVOID HEAT OR FLAMES.  
Materials To Avoid: NONE KNOWN.  
Hazardous Decomp Products: NONE KNOWN.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.  
Route Of Entry - Inhalation: NO  
Route Of Entry - Skin: NO  
Route Of Entry - Ingestion: NO  
Health Haz Acute And Chronic: ACUTE:EYE/SKIN:NONE KNOWN OR EXPECTED.  
INHAL:NONE. METHANE IS NON-TOXIC SIMPLE ASPHYXIAN. CONCENTRATION OF METHANE IN THIS GAS IS TOO LOW TO DEPRESS OXYGEN CONCENTRATION. INGEST:NOT APPLICABLE. THIS MATERIAL IS A GAS. METHANE IS BIOLOGICALLY INACTIVE & ESSENTIALLY NON TOXIC. CHRONIC:NONE KNOWN OR EXPECTED.  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: NO  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: NOT RELEVANT  
Signs/Symptoms Of Overexp: NONE SPECIFIED BY MANUFACTURER.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.  
Emergency/First Aid Proc: INGEST:CALL MD IMMEDIATELY (FP N). INHAL: REMOVE IMMEDIATELY FLUSH W/POTABLE WATER FOR A MINIMUM OF 15 MINUTES, SEEK ASSISTANCE FROM MD (FP N). SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. CALL MD (FP N). NONE NEEDED (MFR).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NONE NEEDED. THIS MATERIAL IS NON TOXIC & NON-FLAMMABLE.  
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.  
Waste Disposal Method: DISPOSE I/A/W ALL LOCAL, STATE & FEDERAL REGULATIONS. DO NOT INCINERATE CYLINDER.  
Precautions-Handling/Storing: DO NOT STORE CYLS NEAR HEAT/OPEN FLAME. EXPOS TO TEMPS 130F MAY CAUSE RUPTURE. SECURE CYLS - DO NOT DROP. CONTENTS UNDER PRESS.  
Other Precautions: DO NOT PUNCTURE. NEVER THROW CNTNR INTO FIRE/INCIN. KEEP CYLS SECURED. DO NOT DROP/DMG. USE PRESS REGULATOR WHEN CONNECTING TO

LOWER PRESS PIPING SYS. USE CHECK VALVE TO PVNT BACKFLOW. KEEP CYLS AWAY FROM HEAT & FLAMES. FOR ADDNL (SUPDAT)

=====  
Control Measures  
=====

Respiratory Protection: NONE NEEDED. SELECTION OF NIOSH/MSHA APPROVED RESPIRATORY PROTECTION DEPENDS ON CONTAMINANT TYPE, FORM & CONCENTRATION. SELECT I/A/W OSHA 1910.134 & GOOD INDUSTRIAL HYGIENE PRACTICE.  
Ventilation: NO SPECIAL VENTILATION REQUIRED.  
Protective Gloves: LEATHER GLOVES.  
Eye Protection: SAFETY GLASSES.  
Other Protective Equipment: NONE NEEDED.  
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.  
Suppl. Safety & Health Data: EXPLO HAZ:OR FLAME MAY VENT RAPIDLY/EXPLODE. OTHER PREC:HNDLG RECS ON COMPRESSED GAS CYLS, CONSULT COMPRESSED GAS ASSOC PAMPHLET P-1. PROTECT FROM HEAT & PHYSICAL DMG.

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Transportation Data  
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=====  
Disposal Data  
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=====  
Label Data  
=====

Label Required: YES  
Technical Review Date: 17FEB94  
Label Date: 16FEB94  
Label Status: G  
Common Name: CALIBRATION GAS, METHANE 500 PPM IN AIR, 51-1816  
Chronic Hazard: NO  
Signal Word: CAUTION!  
Acute Health Hazard-None: X  
Contact Hazard-None: X  
Fire Hazard-Slight: X  
Reactivity Hazard-None: X  
Special Hazard Precautions: NON-FLAMMABLE, BUT COMPRESSED AIR/METHANE WILL ACCELERATE BURNING OF OTHER MATERIALS. CYLINDERS EXPOSED TO HIGH HEAT MAY EXPLODE. ACUTE:EYE/SKIN:NONE KNOWN OR EXPECTED. INHAL:NONE. METHANE IS NON-TOXIC SIMPLE ASPHYXIANT. CONCENTRATION OF METHANE IN THIS GAS IS TOO LOW TO DEPRESS OXYGEN CONCENTRATION. INGEST:NOT APPLICABLE. THIS MATERIAL IS A GAS. CHRONIC:NONE LISTED BY MANUFACTURER.  
Protect Eye: Y  
Protect Skin: Y  
Protect Respiratory: Y  
Label Name: BACHARACH INC  
Label Street: 625 ALPHA DR  
Label City: PITTSBURGH  
Label State: PA  
Label Zip Code: 15238  
Label Country: US  
Label Emergency Number: 800-424-9300 (CHEMTREC)

AIR PRODUCTS & CHEMICALS -- HYDROGEN, COMPRESSED - HYDROGEN,HIGH PURITY  
MATERIAL SAFETY DATA SHEET  
NSN: 6830010114102  
Manufacturer's CAGE: 00742  
Part No. Indicator: A  
Part Number/Trade Name: HYDROGEN, COMPRESSED

=====  
General Information  
=====

Item Name: HYDROGEN,HIGH PURITY  
Company's Name: AIR PRODUCTS AND CHEMICALS, INC.  
Company's Street: 7201 HAMILTON BLVD  
Company's P. O. Box: 538  
Company's City: ALLENTOWN  
Company's State: PA  
Company's Country: US  
Company's Zip Code: 18195-1501  
Company's Emerg Ph #: 800-523-9374/610-481-7711  
Company's Info Ph #: 215-481-4911/800-752-1597  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 002  
Status: SE  
Date MSDS Prepared: 01JUN94  
Safety Data Review Date: 30OCT95  
Supply Item Manager: GSA  
MSDS Preparer's Name: NK  
Preparer's Company: (MSDS #:1009)  
Preparer's St Or P. O. Box: 538  
Preparer's City: ALLENTOWN  
Preparer's State: PA  
Preparer's Zip Code: 18195  
MSDS Serial Number: BHFBW  
Specification Number: UNKNOWN  
Spec Type, Grade, Class: NK  
Hazard Characteristic Code: G2  
Unit Of Issue: CF  
Unit Of Issue Container Qty: UNKNOWN  
Type Of Container: CYLINDER  
Net Unit Weight: UNKNOWN  
Net Explosive Weight: NK  
Coast Guard Ammunition Code: NK

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: HYDROGEN  
Ingredient Sequence Number: 01  
Percent: 100  
NIOSH (RTECS) Number: MW8900000  
CAS Number: 1333-74-0  
OSHA PEL: NOT ESTABLISHED  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit: NONE RECOMMENDED

=====  
Physical/Chemical Characteristics

=====  
Appearance And Odor: FLAMM, OLORLESS, ODORLESS, COMPRESSED GAS PKG IN CYL @HIGH PRESSURE.

Boiling Point: -423F,-253C

Melting Point: -435F,-259C

Vapor Pressure (MM Hg/70 F): N/A

Specific Gravity: 0.0696@32F/1ATM

Solubility In Water: 0.019 VOL/VOL @60F.

Viscosity: N/A

pH: N/A

Radioactivity: NK

Autoignition Temperature: 565.5C  
=====

#### Fire and Explosion Hazard Data

=====  
Flash Point: FLAMMABLE GAS

Lower Explosive Limit: 4

Upper Explosive Limit: 74

Extinguishing Media: CO2, DRY CHEMICAL, WATER SPRAY OR FOG FOR SURROUNDING AREA. DO NOT EXTINGUISH UNTIL HYDROGEN SOURCE IS SHUT OFF.

Special Fire Fighting Proc: EVACUATE PERSONNEL FRM DANGER AREA.IMMED COOL CNTNR W/WATERSPRAY FRM MAX DISTANCE TAKING CARE NOT TO EXT FLAMES.IF ACCIDENTALLY EXT EXPLO RE-IGN MAY OCCUR.(SUP)

Unusual Fire And Expl Hazrds: BURNS W/PALE BLUE,NEARLY INVISIBLE FLAM. EASILY IGN W/LOW-IGN ENERGY(STATIC ELECT).LIGHTER THAN AIR;ACCUMULATE IN UPPER SEC OF ENCLSD SPACES.PRESSURE IN (SUPPLE)  
=====

#### Reactivity Data

=====  
Stability: YES

Cond To Avoid (Stability): PER MSDS:NONE. HOWEVER REMOVE ALL IGN SOURCES. HANDLE CYLINDERS CAREFULLY.

Materials To Avoid: OXIDIZING AGENTS. SOME STEELS ARE SUSCEPTIBLE TO HYDROGEN EMBRITTLEMENT @HIGH PRESSURES & TEMPS. NONE.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT APPLICABLE  
=====

#### Health Hazard Data

=====  
LD50-LC50 Mixture: HYDROGEN IS A SIMPLE ASPHYXIANT.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: INHAL:ASPHYXIANT.BEFORE SUFFOCATION COULD OCCUR LOWER FLAMM LIMIT OF PROD IN AIR WOULD BE EXCEEDED POSSIBLY CAUSING BOTH OXY-DEFICIENT & EXPLO ATM.EXPO TO MODERATE CONCEN MAY CAUSE DIZZ,HEAD, NAU,UNCONSC.EXPO TO ATM W/8-10% OR LESS OXY WILL QUICKLY BRING ABOUT UNCONSC W/O WARNING.LACK OF SUFFICIENT OXY MAY CAUSE (SUPPL)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: PER MSDS:HYDROGEN IS NOT LISTED BY NTP/OSHA/IARC.

Signs/Symptoms Of Overexp: EXPOSURE TO AN OXYGEN-DEFICIENT ATM (<19.5%) MAY CAUSE DIZZINESS, DROWSINESS, NAUSEA, VOMITING, EXCESS SALIVATION, DIMINISHED MENTAL ALERTNESS, LOSS OF CONSCIOUSNESS, AND DEATH.

Med Cond Aggravated By Exp: NONE. TARGET ORGANS:NONE.  
Emergency/First Aid Proc: INHAL:PERSONS SUFFERING FROM LACK OF OXYGEN SHOULD BE REMOVED TO FRESH AIR. IF VICTIM IS NOT BREATHING, ADMINISTER ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. OBTAIN PROMPT MEDICAL ATTN. SKIN/EYE/INGEST:NONE. NOTES TO PHYSICIAN:NONE.

=====  
Precautions for Safe Handling and Use  
=====

Steps If Matl Released/Spill: EVACUATE IMMED.REMOVE POSSIBLE IGN SOURCES. PROVIDE MAX EXPLO-PROOF VENTI.SHUT OFF SOURCE IF POSSIBLE.IF LEAK FRM CYL/ VALVE CALL AIR PRODUCTS.PRESENCE OF H2 FLAME CAN BE DETECTED BY APPROACHING CAUT W/OUTSTRETCHED STRAW BROOM MAKING FLAME VISIBLE.

Neutralizing Agent: NOT APPLICABLE

Waste Disposal Method: DON'T ATTEMPT TO DISPOSE OF RESIDUAL/UNUSED PROD IN CYL.RETURN TO SUPPLIER FOR SAFE DISPOSAL.RESIDUAL PROD W/IN PROCESS SYS MAY BE VENTED @CONTROLLED RATE TO ATM THRU VENT STACK THAT DISCHARGES TO ELEVATED PT.STACK IN ISOLATED AREA AWAY FRM IGN SOURC

Precautions-Handling/Storing: NFPA 50A REQMT.STORE CYL UPRIGHT W/VAL PROT CAP IN PLACE @WELL-PROT WELL-VENTI DRY LOCATION SEPARATED FRM COMBUST MATLS.CYL TEMP SHOULDN'T REACH >125F

Other Precautions: SEPARATE CYL FRM OXY CYL/OXIDIZERS BY 20FT(MIN)DISTANCE OR BARRIER OF NONCOMBUST MATL @LEAST 5FT HI W/@LEAST 1/2 HR FIRE RESISTANCE RATING.PROT FRM PHYS DMG.DON'T DRAG/ROLL/DROP-USE HANDTRUCK.EXPLO PROOF IN STORAGE/USE AREAS (SUPPLEMENT)

=====  
Control Measures  
=====

Respiratory Protection: GENERAL USE:NONE. EMERG USE:AIR SUPPLIED RESPIRATORS ARE REQUIRED IN OXY-DEFICIENT ATMS.BEFORE ENTERING AREA YOU MUST CHECK FOR FLAMM OR OXY-DEFICIENT ATMS.

Ventilation: PROVIDE NATURAL OR EXPLO-PROOF VENTI ADEQUATE TO ENSURE HYDROGEN DOESN'T REACH ITS LOWER EXPLO LIMIT OF 4%.

Protective Gloves: WORK GLOVES WHEN HANDLING CYLINDER.

Eye Protection: SAFETY GLASSES WHEN HANDLING CYLINDER.

Other Protective Equipment: SAFETY SHOES ARE RECOMMENDED WHEN HANDLING CYLINDERS.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: FIREFTG:STOP FLOW OF GAS W/O RISK WHILE CONT COOLING WATERSPRAY. EXPLO/FIRE HAZ:CNTNR CAN BUILDUP DUE TO HEAT;MAY RUPTURE IF PRESSURE RELIEF DEVICES FAIL TO WORK. HEALTH HAZ:SERIOUS INJURY/ DEATH.EYE/SKIN/CHRONIC:NONE. OTHER PREC:(NAT ELECT CODE CLASS I HAZ).USE LEAK DETECTION SOLN.DO NOT USE ADAPTERS.

=====  
Transportation Data  
=====

Trans Data Review Date: 95303

DOT PSN Code: HLR

DOT Proper Shipping Name: HYDROGEN, COMPRESSED

DOT Class: 2.1

DOT ID Number: UN1049

DOT Label: FLAMMABLE GAS

DOT/DoD Exemption Number: NK

IMO PSN Code: IGH

IMO Proper Shipping Name: HYDROGEN, COMPRESSED

IMO Regulations Page Number: 2148

IMO UN Number: 1049

IMO UN Class: 2(2.1)

IMO Subsidiary Risk Label: -  
IATA PSN Code: NSD  
IATA UN ID Number: 1049  
IATA Proper Shipping Name: HYDROGEN, COMPRESSED  
IATA UN Class: 2.1  
IATA Label: FLAMMABLE GAS  
AFI PSN Code: NSD  
AFI Symbols: 0  
AFI Prop. Shipping Name: HYDROGEN, COMPRESSED  
AFI Class: 2.1  
AFI ID Number: UN1049  
AFI Basic Pac Ref: A6.3,A6.7  
MMAC Code: NK  
N.O.S. Shipping Name: HYDROGEN, COMPRESSED.  
Additional Trans Data: PER MSDS:DOT SHIPPING NAME:HYDROGEN, COMPRESSED,  
HAZ 2.1, UN 1049, RQ:NONE, LABEL:FLAMM GAS. CYLINDER SHOULD BE TRANSP IN  
SECURE UPRIGHT POSITION IN WELL VENTI TRUCK. NEVER TRANSP IN PASSENGER  
COMPARTMENT OF VEHICLE.

=====  
Disposal Data  
=====

=====  
Label Data  
=====

Label Required: YES  
Technical Review Date: 30OCT94  
Label Status: F  
Common Name: HYDROGEN, COMPRESSED  
Chronic Hazard: NO  
Signal Word: DANGER!  
Acute Health Hazard-Severe: X  
Contact Hazard-None: X  
Fire Hazard-Severe: X  
Reactivity Hazard-None: X  
Special Hazard Precautions: FLAMM COMPRESSED GAS.INHAL:ASPHYXIAN.T.BEFORE  
SUFFOCATION COULD OCCUR LOWER FLAMM LIMIT OF PROD IN AIR WOULD BE EXCEEDED  
POSSIBLY CAUSING BOTH OXY-DEFICIENT & EXPLO ATM.EXPO TO MODERATE CONCEN MAY  
CAUSE DIZZ,HEAD,NAU,UNCONSC.EXPO TO ATM W/8-10% OR LESS OXY WILL QUICKLY  
BRING ABOUT UNCONSC W/O WARNING.LACK OF SUFFICIENT OXY MAY CAUSE SERIOUS  
INJURY OR DEATH.TARGET ORGANS:NONE.1ST AID:INHAL:SUFFERING FRM LACK OF OXY  
SHOULD BE REMOVED TO FRESH AIR.NOT BREATH ADMINISTER ART RESP.BREATH  
DIFFICULT ADMINISTER OXY.GET PROMPT MED ATTN.SKIN/EYE/INGEST:NONE.FIRE:CO2,  
DRY CHEM,WATERSPRAY/FOG.DON'T EXTINGUISH TIL HYDROGEN SOURCE IS SHUT OFF.  
Label Name: AIR PRODUCTS AND CHEMICALS, INC.  
Label Street: 7201 HAMILTON BLVD  
Label City: ALLENTOWN  
Label State: PA  
Label Zip Code: 18195-1501  
Label Country: US  
Label Emergency Number: 800-523-9374/610-481-7711

ALDRICH CHEMICAL -- HYDROCHLORIC ACID 37% A.C.S REAGENT 32033-1  
MATERIAL SAFETY DATA SHEET  
NSN: 681000N014447  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: HYDROCHLORIC ACID 37% A.C.S REAGENT 32033-1

=====  
General Information  
=====

Company's Name: ALDRICH CHEMICAL CO  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53201  
Company's Info Ph #: 414-273-3850  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 16MAR90  
Safety Data Review Date: 20JUL95  
MSDS Serial Number: BKKZK  
Hazard Characteristic Code: C1

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: HYDROGEN CHLORIDE (HYDROCHLORIC ACID) (SARA III)  
Ingredient Sequence Number: 01  
Percent: 37  
NIOSH (RTECS) Number: MW4025000  
CAS Number: 7647-01-0  
OSHA PEL: C 5 PPM  
ACGIH TLV: C 5 PPM; 9192

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: COLORLESS LIQUID, PUNGENT ODOR.  
Boiling Point: 123F,51C  
Melting Point: 77.7F,25.4C  
Vapor Pressure (MM Hg/70 F): 3.23@21.1C  
Vapor Density (Air=1): 1.3  
Specific Gravity: 1.2  
Solubility In Water: SOLUBLE

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: NONE  
Lower Explosive Limit: N/A  
Upper Explosive Limit: N/A  
Extinguishing Media: NONCOMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.  
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT TO PREVENT CONTACT WITH SKIN AND EYES. USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.  
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

Reactivity Data

=====  
Stability: YES  
Cond To Avoid (Stability): DO NOT ALLOW WATER TO ENTER CONTAINER BECAUSE OF VIOLENT REACTION.  
Materials To Avoid: BASES, AMINES, ALKALI METALS, COPPER, COPPER ALLOYS, ALUMINUM, CORRODES STEEL.  
Hazardous Decomp Products: TOXIC FUMES OF:HYDROGEN CHLORIDE GAS.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT  
=====

Health Hazard Data

=====  
LD50-LC50 Mixture: LD50:(IPR,MUS)1449 MG/KG;(SEE SUPP DATA)  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: NO  
Route Of Entry - Ingestion: NO  
Health Haz Acute And Chronic: ACUTE:MAY BE FATAL IF INHALED OR INGESTED. CAUSES BURNS. MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF MUCOUS MEMBRANES & UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS RESULT OF SPASM, INFLAMMATION & EDEMA OF LARYNX & BRONCHI, CHEMICAL PNEUMONITIS & PULMONARY EDEMA.  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: NO  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: NOT RELEVANT  
Signs/Symptoms Of Overexp: BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.  
Emergency/First Aid Proc: EYES:IMMEDIATELY FLUSH W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MINUTES. ASSURE ADEQ FLUSHING BY SEPARATING LIDS W/ FINGERS. SKIN:IMMEDIATELY FLUSH W/COPIOUS AMTS OF WATER FOR 15 MINUTES WHILE REMOVING CONTAM CLTHG/SHOES. WASH CONTAM CLTHG BEFORE REUSE. DISCARD CONTAM SHOES. INHAL:REMOVE TO FRESH AIR. SUPPORT BRTHG (GIVE O\*2/ARTF RESP) , CALL MD. INGEST:CALL MD IMMEDIATELY (FP N).  
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Precautions for Safe Handling and Use

=====  
Steps If Matl Released/Spill: EVACUATE AREA. WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS & HEAVY RUBBER GLOVES. COVER W/DRY-LIME, SAND, SODA ASH. PLACE IN COVERED CNTNRS USING NONSPARKING TOOLS & TRANSPORT OUTDOORS. VENT AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.  
Neutralizing Agent: SEE WASTE DISPOSAL METHOD.  
Waste Disposal Method: SMALL QYTS:SLOWLY ADD TO LG STIRRED EXCESS OF WATER. ADJUST PH TO NEUTRAL, SEPARATE ANY INSOLUBLE SOLIDS/LIQ & PACKAGE FOR HAZ WASTE DISP. FLUSH AQUEOUS SOLN DOWN DRAIN W/PLENTY OF WATER. HYDROLYSIS/NEUTRALIZATION RXN MAY GENERATE HEAT(SEE SUPP DATA)  
Precautions-Handling/Storing: STORE IN COOL,DRY PLACE. OPEN CAREFULLY. KEEP TIGHTLY CLOSED. AVOID PRLNGD/RPTD EXPOSURE. DO NOT GET IN EYES, ON SKIN OR CLTHG. AVOID BREATHING VAPOR.  
Other Precautions: POISON. CORROSIVE. REACTS VIOLENTLY WITH WATER. MAY DEVELOP PRESSURE. DO NOT PIPET BY MOUTH.  
=====

Control Measures

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Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR IN NONVENTILATED AREAS AND/OR FOR EXPOSURE ABOVE ACGIH TLV.  
=====

Ventilation: MECHANICAL EXHAUST REQUIRED.  
Protective Gloves: NEOPRENE/PVC GLOVES.  
Eye Protection: CHEMICAL WORKERS GOGGLES (FP N).  
Other Protective Equipment: SAFETY SHOWER AND EYE BATH. FACESHIELD (8-INCH MINIMUM).  
Work Hygienic Practices: WASH HANDS THOROUGHLY AFTER USE AND BEFORE EATING, DRINKING, SMOKING OR USING SANITARY FACILITIES (FP N).  
Suppl. Safety & Health Data: LD50-LC50 MIX:LD50:(ORL,RBT)900 MG/KG. WASTE DISP METH:AND FUMES WHICH CAN BE CONTROLLED BY RATE OF ADDITION. DISPOSE OF I/A/W FEDERAL, STATE AND LOCAL REGULATIONS.

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Transportation Data  
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Trans Data Review Date: 91221  
DOT PSN Code: HJG  
DOT Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION  
DOT Class: 8  
DOT ID Number: UN1789  
DOT Pack Group: II  
DOT Label: CORROSIVE  
IMO PSN Code: IHF  
IMO Proper Shipping Name: HYDROGEN CHLORIDE  
IMO Regulations Page Number: SEE 8183  
IMO UN Number: 1789  
IMO UN Class: 8  
IMO Subsidiary Risk Label: -  
IATA PSN Code: NPG  
IATA UN ID Number: 1789  
IATA Proper Shipping Name: HYDROCHLORIC ACID  
IATA UN Class: 8  
IATA Label: CORROSIVE  
AFI PSN Code: NPG  
AFI Symbols: T  
AFI Prop. Shipping Name: HYDROCHLORIC ACID, SOLUTION  
AFI Class: 8  
AFI ID Number: UN1789  
AFI Pack Group: II  
AFI Special Prov: A3,A6,N41  
AFI Basic Pac Ref: 12-5

=====  
Disposal Data  
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=====  
Label Data  
=====

Label Required: YES  
Technical Review Date: 06JUN91  
Label Date: 06JUN91  
Label Status: G  
Common Name: HYDROCHLORIC ACID  
Chronic Hazard: YES  
Signal Word: DANGER!  
Acute Health Hazard-Slight: X  
Contact Hazard-Severe: X  
Fire Hazard-None: X  
Reactivity Hazard-Moderate: X  
Special Hazard Precautions: ACUTE: INHALATION MAY BE FATAL AS A RESULT OF

SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL  
PNEUMONITIS AND PULMONARY EDEMA. EXTREMELY DESTRUCTIVE TO MUCOUS MEMBRANES,  
EYES, SKIN. CHRONIC: MAY DAMAGE EYES, LUNGS. WARNING! REACTS VIOLENTLY WITH  
WATER.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: ALDRICH CHEMICAL CO

Label P.O. Box: 355

Label City: MILWAUKEE

Label State: WI

Label Zip Code: 53201

Label Country: US

ALDRICH CHEMICAL -- NITRIC ACID, 90% ACS REAGENT, 25812-1  
MATERIAL SAFETY DATA SHEET  
NSN: 681000N073464  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: NITRIC ACID, 90% ACS REAGENT, 25812-1

=====  
General Information  
=====

Company's Name: ALDRICH CHEMICAL CO INC  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53201  
Company's Emerg Ph #: 414-273-3850  
Company's Info Ph #: 414-273-3850  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 10MAY96  
Safety Data Review Date: 01OCT96  
MSDS Serial Number: CCNRN

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: NITRIC ACID (SARA 302/313) (CERCLA)  
Ingredient Sequence Number: 01  
Percent: 90  
NIOSH (RTECS) Number: QU5775000  
CAS Number: 7697-37-2  
OSHA PEL: 2 PPM  
ACGIH TLV: 2 PPM/4 STEL

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: PALE-YELLOW LIQUID  
Vapor Pressure (MM Hg/70 F): 6.6 @ 20C  
Vapor Density (Air=1): 1.3  
Specific Gravity: 1.490

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: NONE  
Extinguishing Media: NON-COMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS. DO NOT USE WATER.  
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). PREVENT CONTACT WITH SKIN AND EYES. REACTS VIOLENTLY WITH WATER.  
Unusual Fire And Expl Hazrds: STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

=====  
Reactivity Data  
=====

Stability: YES  
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.

Materials To Avoid: BASES, REDUCING AGENTS, ALCOHOLS, ALKALI METALS, BRASS, COPPER, COPPER ALLOYS, GALVANIZED IRON, ALUMINUM. (SUP DAT)  
Hazardous Decomp Products: TOXIC FUMES OF NITROGEN OXIDES.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT.

=====  
Health Hazard Data  
=====

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Haz Acute And Chronic: ACUTE: MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN. CAUSES BURNS. MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL (EFTS OF OVEREXP)  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: NO  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: NOT RELEVANT.  
Signs/Symptoms Of Overexp: HLTH HAZ: PNEUMONITIS AND PULMONARY EDEMA. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.  
Emergency/First Aid Proc: EYES/SKIN: IMMED FLUSH W/COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAM CLOTHING & SHOES. REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL MD IMMED. DISCARD CONTAM CLTHG & SHOES.

=====  
Precautions for Safe Handling and Use  
=====

Steps If Matl Released/Spill: WEAR NIOSH APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL. VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.  
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.  
Waste Disposal Method: FOR SML QTYS: CAUTIOUSLY ADD TO LGE STIRRED EXCESS OF WATER. ADJUST PH TO NEUT. SEPARATE ANY INSOL SOLIDS/LIQS & PACKAGE THEM FOR HAZ WASTE DISP. FLUSH AQUEOUS SOLN DOWN DRAIN W/PLENTY OF WATER. THE HYDROLYSIS & NEUT RXNS MAY GENERATE HEAT (SUP DAT)  
Precautions-Handling/Storing: AVOID CONTACT AND INHALATION. AVOID PROLONGED OR REPEATED EXPOSURE. POISON. CORROSIVE. DO NOT ALLOW CONTACT WITH WATER.  
Other Precautions: KEEP TIGHTLY CLOSED. DO NOT STORE NEAR, NOR ALLOW CONTACT WITH, CLOTHING AND OTHER COMBUSTIBLE MATERIAL. REFRIGERATE.

=====  
Control Measures  
=====

Respiratory Protection: NIOSH APPROVED RESPIRATOR.  
Ventilation: MECHANICAL EXHAUST REQUIRED.  
Protective Gloves: WEAR HEAVY RUBBER GLOVES.  
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (SUP DAT)  
Other Protective Equipment: EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N). RUBBER APRON.  
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

Suppl. Safety & Health Data: MATLS TO AVOID: CORRODES STEEL. ORG MATLS, AMINES. MAY DISCOLOR ON EXPOS TO LIGHT. REACTS VIOLENTLY W/WATER. WASTE DISP METH: & FUMES WHICH CAN BE CONTROLLED BY RATE OF ADDN. OBSERVE ALL FED, STATE & LOC ENVIRON REGS. EYE PROT: & FULL LENGTH FACESHIELD (FP N).

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Transportation Data  
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Disposal Data  
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Label Data  
=====

Label Required: YES  
Technical Review Date: 01OCT96  
Label Date: 01OCT96  
Label Status: G  
Common Name: NITRIC ACID, 90% ACS REAGENT, 25812-1  
Chronic Hazard: NO  
Signal Word: DANGER!  
Acute Health Hazard-Severe: X  
Contact Hazard-Severe: X  
Fire Hazard-Slight: X  
Reactivity Hazard-Moderate: X  
Special Hazard Precautions: CORROSIVE. ACUTE: MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN. CAUSES BURNS. MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING. CHRONIC: NONE SPECIFIED BY MANUFACTURER.  
Protect Eye: Y  
Protect Skin: Y  
Protect Respiratory: Y  
Label Name: ALDRICH CHEMICAL CO INC  
Label P.O. Box: 355  
Label City: MILWAUKEE  
Label State: WI  
Label Zip Code: 53201  
Label Country: US  
Label Emergency Number: 414-273-3850

ALDRICH CHEMICAL -- 25810-5, SULFURIC ACID, 95-98%, A.C.S. REAG  
MATERIAL SAFETY DATA SHEET  
NSN: 681000N033846  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: 25810-5, SULFURIC ACID, 95-98%, A.C.S. REAG

=====  
General Information  
=====

Company's Name: ALDRICH CHEMICAL CO  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53201  
Company's Emerg Ph #: 414-273-3850  
Company's Info Ph #: 414-273-3850  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 25FEB92  
Safety Data Review Date: 11AUG92  
MSDS Serial Number: BPQND  
Hazard Characteristic Code: NK

=====  
Ingredients/Identity Information  
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Proprietary: NO  
Ingredient: SULFURIC ACID (SARA III)  
Ingredient Sequence Number: 01  
Percent: 95-98  
NIOSH (RTECS) Number: WS5600000  
CAS Number: 7664-93-9  
OSHA PEL: 1 MG/M3  
ACGIH TLV: 1 MG/M3;3 STEL

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Proprietary: NO  
Ingredient: WASTE DISP METH: AND FUMES WHICH CAN BE CONTROLLED BY RATE OF  
ADDITION. DISPOSE OF I/A/W FED, ST AND LOCAL REGS (FP N).  
Ingredient Sequence Number: 02  
NIOSH (RTECS) Number: 9999999ZZ  
OSHA PEL: NOT APPLICABLE  
ACGIH TLV: NOT APPLICABLE

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Proprietary: NO  
Ingredient: OTHER PREC: KEEP AWAY FROM COMBUSTIBLE MATERIAL. WEAR SUITABLE  
PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROT. (ING 4)  
Ingredient Sequence Number: 03  
NIOSH (RTECS) Number: 9999999ZZ  
OSHA PEL: NOT APPLICABLE  
ACGIH TLV: NOT APPLICABLE

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Proprietary: NO  
Ingredient: ING 3: DO NOT BREATHE VAPOR. IF YOU FEEL UNWELL, SEEK MEDICAL  
ADVICE (SHOW LABEL WHERE POSSIBLE).  
Ingredient Sequence Number: 04  
NIOSH (RTECS) Number: 9999999ZZ

OSHA PEL: NOT APPLICABLE  
ACGIH TLV: NOT APPLICABLE

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Physical/Chemical Characteristics

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Appearance And Odor: VISCOUS COLORLESS LIQUID.  
Vapor Pressure (MM Hg/70 F): 1 @ 145.8C  
Vapor Density (Air=1):

ALDRICH CHEMICAL -- SODIUM HYDROXIDE, 50% SOLUTION IN WATER, 41541-3  
MATERIAL SAFETY DATA SHEET  
NSN: 681000N069964  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: SODIUM HYDROXIDE, 50% SOLUTION IN WATER, 41541-3

=====  
General Information  
=====

Company's Name: ALDRICH CHEMICAL CO INC  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53201  
Company's Emerg Ph #: 414-273-3850  
Company's Info Ph #: 414-273-3850  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 11OCT95  
Safety Data Review Date: 15MAR96  
MSDS Serial Number: BZSML

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Ingredients/Identity Information  
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Proprietary: NO  
Ingredient: SODIUM HYDROXIDE (CERCLA)  
Ingredient Sequence Number: 01  
NIOSH (RTECS) Number: WB4900000  
CAS Number: 1310-73-2  
OSHA PEL: 2 MG/M3  
ACGIH TLV: C 2 MG/M3

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: NONE SPECIFIED BY MANUFACTURER  
Specific Gravity: 1.515

=====  
Fire and Explosion Hazard Data  
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Flash Point: NONE  
Extinguishing Media: USE DRY CHEMICAL POWDER. DO NOT USE WATER.  
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA & FULL  
PROTECTIVE EQUIPMENT (FP N). REACTS VIOLENTLY WITH WATER.  
Unusual Fire And Expl Hazrds: EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

=====  
Reactivity Data  
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Stability: YES  
Cond To Avoid (Stability): REACTS VIOLENTLY WITH WATER.  
Materials To Avoid: ACIDS, ALUMINUM, ZINC, TIN, ORG MATLS, PHOSPHORUS,  
CHLORINATED SOLV, SENSITIVE TO AIR, PROTECT FROM LIGHT. (SUP DAT)  
Hazardous Decomp Products: NATURE OF DECOMPOSITION PRODUCTS NOT KNOWN.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED, INHALED/  
ABSORBED THRU SKIN. EXTREMELY DESTRUCTIVE TO TISS OF MUC MEMB & UPPER RESP  
TRACT, EYES & SKIN. INHAL MAY BE FATAL AS RSLT OF SPASM, INFLAMM & EDEMA OF  
LARYNX & BRONCHI, CHEM PNEUMIT & PULM EDEMA. SYMPS OF EXPOS MAY INCL  
BURNING SENSATION, COUGHING, WHEEZING, (EFTS OF OVEREXPOSURE)  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: NO  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: NOT RELEVANT.  
Signs/Symptoms Of Overexp: HLTH HAZ: LARYNGITIS, SHORTNESS OF BREATH,  
HDCH, NAUS & VOMIT. TO THE BEST OF MFR KNOWLEDGE, THE CHEMICAL, PHYSICAL &  
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THORO INVESTIGATED.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.  
Emergency/First Aid Proc: EYES/SKIN: IMMED FLUSH W/COPIOUS AMOUNTS OF  
WATER FOR AT LEAST 15 MIN WHILE REMOVING CONTAM CLOTHING. ASSURE ADEQUATE  
FLUSHING OF EYES BY SEPARATING EYELIDS W/FINGERS. INHAL: REMOVE TO FRESH  
AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESP. IF BREATHING IS DIFFICULT,  
GIVE OXYGEN. INGEST: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS.  
CALL MD. WASH CONTAM CLTHG BEFORE REUSE. DISCARD CONTAM SHOES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: EVACUATE AREA. WEAR NIOSH/MSHA APPROVED  
SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. ABSORB ON SAND OR VERMICULITE  
AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL. VENTILATE AREA AND WASH SPILL  
SITE AFTER MATERIAL PICKUP IS COMPLETE.  
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.  
Waste Disposal Method: FOR SML QTYS: CAUTIOUSLY ADD TO LGE STIRRED EXCESS  
OF WATER. ADJUST PH TO NEUT, SEPARATE ANY INSOLUBLE SOLIDS/LIQS & PACKAGE  
THEM FOR HAZ WASTE DISP. FLUSH AQUEOUS SOLN DOWN DRAIN W/PLENTY OF WATER.  
HYDROLYSIS & NEUTRALIZATION RXNS MAY (SUP DAT)  
Precautions-Handling/Storing: DO NOT GET IN EYES, ON SKIN, ON CLOTHING.  
AVOID PROLONGED OR REPEATED EXPOSURE. CORROSIVE. TOXIC. KEEP TIGHTLY  
CLOSED. STORE IN A COOL DRY PLACE.  
Other Precautions: DO NOT FREEZE.

Control Measures

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.  
Ventilation: USE ONLY IN A CHEMICAL FUME HOOD.  
Protective Gloves: CHEMICAL-RESISTANT GLOVES.  
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS (FP N).  
Other Protective Equipment: PROTECTIVE CLOTHING. EMERGENCY EYEWASH &  
DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).  
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.  
Suppl. Safety & Health Data: MATLS TO AVOID: REACTS VIOLENTLY W/WATER.  
ABSORBS CO\*2 FROM AIR. WASTE DISP METH: GENERATE HEAT & FUMES WHICH CAN BE  
CONTROLLED BY RATE OF ADDITION. OBSERVE ALL FED, STATE & LOC ENVIRON REGS.

Transportation Data

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Disposal Data  
=====

=====  
Label Data  
=====

Label Required: YES  
Technical Review Date: 15MAR96  
Label Date: 15MAR96  
Label Status: G  
Common Name: SODIUM HYDROXIDE, 50% SOLUTION IN WATER, 41541-3  
Chronic Hazard: NO  
Signal Word: DANGER!  
Acute Health Hazard-Moderate: X  
Contact Hazard-Severe: X  
Fire Hazard-None: X  
Reactivity Hazard-Slight: X  
Special Hazard Precautions: REACTS VIOLENTLY WITH WATER. ACUTE: HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH THE SKIN. EXTREMELY DESTRUCTIVE TO TISSUE OF MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN. INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA. SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING. CHRONIC: NONE SPECIFIED BY MANUFACTURER.  
Protect Eye: Y  
Protect Skin: Y  
Protect Respiratory: Y  
Label Name: ALDRICH CHEMICAL CO INC  
Label P.O. Box: 355  
Label City: MILWAUKEE  
Label State: WI  
Label Zip Code: 53201  
Label Country: US  
Label Emergency Number: 414-273-3850

ALDRICH CHEMICAL SUB OF SIGMA-ALDRICH -- 65550 METHANOL  
MATERIAL SAFETY DATA SHEET  
NSN: 681000F030311  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: 65550 METHANOL

=====  
General Information  
=====

Company's Name: ALDRICH CHEMICAL CO SUB OF SIGMA-ALDRICH  
Company's Street: 1001 W ST PAUL AVE  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53233  
Company's Emerg Ph #: 800-325-5832-S/800-231-8327-A  
Company's Info Ph #: 800-325-5832-S/800-231-8327-A  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SE  
Date MSDS Prepared: 01APR92  
Safety Data Review Date: 30SEP93  
Preparer's Company: ALDRICH CHEMICAL CO SUB OF SIGMA-ALDRICH  
Preparer's St Or P. O. Box: 1001 W ST PAUL AVE  
Preparer's City: MILWAUKEE  
Preparer's State: WI  
Preparer's Zip Code: 53233  
MSDS Serial Number: BRXZV

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS  
Ingredient Sequence Number: 01  
NIOSH (RTECS) Number: PC1400000  
CAS Number: 67-56-1  
OSHA PEL: S,200PPM/250STEL  
ACGIH TLV: S,200PPM/250STEL; 93  
Other Recommended Limit: 200 PPM

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: COLORLESS LIQUID  
Boiling Point: 64.6C  
Melting Point: -98C  
Vapor Pressure (MM Hg/70 F): 97.68  
Vapor Density (Air=1): 1.1  
Specific Gravity: 0.791

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: 52F  
Lower Explosive Limit: 6%  
Upper Explosive Limit: 36%  
Extinguishing Media: CO2, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.  
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS & FULL

PROTECTIVE CLOTHING.

Unusual Fire And Expl Hazrds: VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO 725F.

=====  
Reactivity Data  
=====

Stability: YES

Cond To Avoid (Stability): HEAT, SPARKS, OPEN FLAME OR OTHER SOURCES OF IGNITION.

Materials To Avoid: ACIDS, ACID CHLORIDES, ACID ANHYDRIDES, OXIDIZING/REDUCING AGENTS, ALKALI METALS.

Hazardous Decomp Products: CO, CO2

Hazardous Poly Occur: NO  
=====

Health Hazard Data  
=====

LD50-LC50 Mixture: ORAL LD50 (RAT): 5628 MG/KG

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR OR MIST IS IRRITATING TO THEY EYES, MUCOUS MEMBRANES, SKIN, & UPPER RESPIRATORY TRACT. CAN CAUSE DAMAGE TO THE EYES, LIVER, HEART, KIDNEYS. GASTROINTESTINAL DISTURBANCES & CONVULSIONS. MAY CAUSE BLINDNESS IF INGESTED.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE

Signs/Symptoms Of Overexp: OPTIC NERVE NEUROPATHY, VISUAL FIELD CHANGES, HEADACHE, DYSPNEA, NAUSEA, VOMITING.

Med Cond Aggravated By Exp: CUTS, SCRATCHES

Emergency/First Aid Proc: EYES/SKIN: FLUSH W/PLENTY OF WATER FOR AT LEAST 15 MINS WHILE REMOVING CONTAMINATED CLOTHING & SHOES. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHIG IS DIFFICULT, GIVE OXYGEN. INGESTION: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. DISCARD CONTAMINATED CLOTHING & SHOES. OBTAIN MEDICAL ATTENTION IN ALL CASES.  
=====

Precautions for Safe Handling and Use  
=====

Steps If Matl Released/Spill: EVACUATE AREA. SHUT OFF ALL IGNITION SOURCES. USE PROTECTIVE EQUIP. COVER W/DRY-LIME, SAND OR SODA ASH. PLACE IN COVERED CONTAIERS USING NON-SPARKING TOOLS & TRANSPORT OUTDOORS. VENTILATE AREA & WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

Neutralizing Agent: DRY LIME, SAND OR SODA ASH

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS. UN1230.

Precautions-Handling/Storing: KEEP TIGHTLY CLOSED & AWAY FROM HEAT, SPARKS & OPEN FLAME. PRODUCT IS HYGROSCOPIC. STORE IN A COOL DRY PLACE. NO SMOKING. CANNOT BE MADE NON-POISONOUS

Other Precautions: AVOID CONTACT W/EYES, SKIN, CLOTHING & BREATHING OF VAPORS. DON'T USE IF SKIN IS CUT OR SCRATCHED.  
=====

Control Measures  
=====

Respiratory Protection: WEAR AN APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation: MECHANICAL EXHAUST

Protective Gloves: CHEMICAL RESISTANT

Eye Protection: SAFETY GOGGLES

Other Protective Equipment: RUBBER BOOTS, SAFETY SHOWER, EYE BATH

Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.

=====  
Transportation Data  
=====

=====  
Disposal Data  
=====

=====  
Label Data  
=====

Label Required: YES

Technical Review Date: 30SEP93

Label Date: 17SEP93

Label Status: F

Common Name: 65550 METHANOL

Chronic Hazard: YES

Signal Word: DANGER!

Acute Health Hazard-Severe: X

Contact Hazard-Severe: X

Fire Hazard-Severe: X

Reactivity Hazard-Slight: X

Special Hazard Precautions: MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES, SKIN, & UPPER RESPIRATORY TRACT. CAN CAUSE DAMAGE TO THE EYES, LIVER, HEART, KIDNEYS. GASTROINTESTINAL DISTURBANCES & CONVULSIONS. MAY CAUSE BLINDNESS IF INGESTED. TARGET ORGANS: EYES, SKIN, LIVER, HEART, KIDNEYS, RESPIRATORY & DIGESTIVE TRACTS. DIGESTIVE TRACTS, LIVER.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: ALDRICH CHEMICAL CO SUB OF SIGMA-ALDRICH

Label Street: 1001 W ST PAUL AVE

Label P.O. Box: 355

Label City: MILWAUKEE

Label State: WI

Label Zip Code: 53233

Label Country: US

Label Emergency Number: 800-325-5832-S/800-231-8327-A

Year Procured: UNK

ALDRICH CHEMICAL -- HEXANE ACS GRADE - N-HEXANE  
MATERIAL SAFETY DATA SHEET  
NSN: 681000N040300  
Manufacturer's CAGE: 60928  
Part No. Indicator: A  
Part Number/Trade Name: HEXANE ACS GRADE

=====  
General Information  
=====

Item Name: N-HEXANE  
Company's Name: ALDRICH CHEMICAL CO  
Company's P. O. Box: 355  
Company's City: MILWAUKEE  
Company's State: WI  
Company's Country: US  
Company's Zip Code: 53201  
Company's Emerg Ph #: 414-273-3850  
Company's Info Ph #: 414-273-3850  
Record No. For Safety Entry: 001  
Tot Safety Entries This Stk#: 001  
Status: SMJ  
Date MSDS Prepared: 04AUG92  
Safety Data Review Date: 03MAR93  
MSDS Serial Number: BRZJT  
Hazard Characteristic Code: NK

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient: HEXANE  
Ingredient Sequence Number: 01  
NIOSH (RTECS) Number: MN9275000  
CAS Number: 110-54-3  
OSHA PEL: 500 PPM  
ACGIH TLV: 50 PPM; 9293

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: COLORLESS LIQUID  
Boiling Point: 154F,68C  
Vapor Pressure (MM Hg/70 F): 132@20C  
Vapor Density (Air=1): 3  
Specific Gravity: 0.661

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: -10F,-23C  
Lower Explosive Limit: 1.2%  
Upper Explosive Limit: 7.7%  
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.  
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.  
Unusual Fire And Expl Hazrds: VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK. CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS. EXTREMELY FLAMMABLE.

=====  
Reactivity Data  
=====

Stability: YES  
Cond To Avoid (Stability): HEAT, SPARKS AND OPEN FLAME.  
Materials To Avoid: OXIDIZING AGENTS. CHLORINE, FLUORINE, MAGNESIUM  
PERCHLORATGE.  
Hazardous Decomp Products: TOXIC FUMES OF: CARBON MONOXIDE, CARBON  
DIOXIDE.  
Hazardous Poly Occur: NO  
Conditions To Avoid (Poly): NOT RELEVANT  
=====

=====  
Health Hazard Data  
=====

LD50-LC50 Mixture: LD50:(ORAL,RAT)28710 MG/KG  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Haz Acute And Chronic: ACUTE: HARMFUL IF SWALLOWED, INHALED, OR  
ABSORBED THRU SKIN. VAPOR OR MIST IS IRRITATING TO EYES, MUCOUS MEMBRANES  
AND UPPER RESPIRATORY TRACT. CAUSES SKIN IRRITATION. MAY CAUSE NERVOUS  
SYSTEM DISTURBANCES. EXPOSURE CAN CAUSE: COUGHING, CHEST PAINS, DIFFICULTY  
IN BREATHING. LUNG IRRIT, CHEST PAIN (EFTS OF OVEREXP)  
Carcinogenicity - NTP: NO  
Carcinogenicity - IARC: NO  
Carcinogenicity - OSHA: NO  
Explanation Carcinogenicity: NOT RELEVANT  
Signs/Symptoms Of Overexp: HLTH HAZ: & EDEMA WHICH MAY BE FATAL. GI  
DISTURBANCES, NAUSEA, HEADACHE AND VOMITING.  
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.  
Emergency/First Aid Proc: EYES: IMMED FLUSH W/COPIOUS AMTS OF WATER FOR @  
LST 15 MIN & SEEK MED ADVICE. SKIN: IMMED FLUSH W/COPIOUS AMTS OF WATER FOR  
@ LST 15 MIN WHILE REMOVING CONTAMD CLTHG & SHOES. WASH CONTAMD CLTHG  
BEFORE REUSE. INHAL: REMOVE TO FRESH AIR. IF NOT BRTHG GIVE ARTF RESP. IF  
BREATHING IS DIFFICULT, GIVE OXYGEN. INGEST: WASH OUT MOUTH W/ WATER  
PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.  
=====

=====  
Precautions for Safe Handling and Use  
=====

Steps If Matl Released/Spill: EVAC AREA. SHUT OFF ALL SOURCES OF IGNIT.  
WEAR NIOSH/MSHA APPRVD SCBA, RUBB BOOTS & HEAVY RUBB GLOVES. COVER W/AN  
ACTIVATED CARBON ABSORB, TAKE UP & PLACE IN CLSD CONTRS. TRANSPORT  
OUTDOORS. VENT AREA & WASH SPILL SITE AFTER MATL PICKUP IS COMPLETE.  
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.  
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN  
AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL  
IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL  
REGULATIONS.  
Precautions-Handling/Storing: KEEP TIGHTLY CLSD. STORE IN A COOL DRY  
PLACE. DO NOT BREATHE VAP. AVOID CONT W/EYES/SKIN/CLTHG. IRRITANT. HARMFUL  
VAP. NEUROLOGICAL HAZARD.  
Other Precautions: KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.  
=====

=====  
Control Measures  
=====

Respiratory Protection: WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.  
Ventilation: USE ONLY IN A CHEMICAL FUME HOOD.

Protective Gloves: CHEMICAL-RESISTANT GLOVES.  
Eye Protection: CHEMICAL SAFETY GOGGLES.  
Other Protective Equipment: OTHER PROTECTIVE CLOTHING, SAFETY SHOWER AND EYE BATH.  
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.  
Suppl. Safety & Health Data: NONE SPECIFIED BY MANUFACTURER.

=====  
Transportation Data  
=====

=====  
Disposal Data  
=====

=====  
Label Data  
=====

Label Required: YES  
Technical Review Date: 03MAR93  
Label Date: 03MAR93  
Label Status: G  
Common Name: HEXANE ACS GRADE  
Chronic Hazard: NO  
Signal Word: DANGER!  
Acute Health Hazard-Severe: X  
Contact Hazard-Slight: X  
Fire Hazard-Severe: X  
Reactivity Hazard-None: X  
Special Hazard Precautions: STORE IN A COOL DRY PLACE. DO NOT BREATHE VAPOR. AVOID CONTACT W/EYES/SKIN/CLTHG. IRRITANT. HARMFUL VAPOR. HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THRU SKIN. VAPOR/MIST IS IRRITATING TO EYES, MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT. CAUSES COUGHING, CHEST PAINS, DIFFICULTY IN BREATHING, LUNG IRRITATION, CHEST PAIN & EDEMA WHICH MAY BE FATAL. GI DISTURBANCES, NAUSEA, HEADACHE AND VOMITING. CHRONIC: NONE LISTED BY MANUFACTURER.  
Protect Eye: Y  
Protect Skin: Y  
Protect Respiratory: Y  
Label Name: ALDRICH CHEMICAL CO  
Label P.O. Box: 355  
Label City: MILWAUKEE  
Label State: WI  
Label Zip Code: 53201  
Label Country: US  
Label Emergency Number: 414-273-3850

## **Attachment 5**

### **Self Assessment Checklist**



# JOBSITE SAFETY INSPECTION CHECKLIST

Revision.: 02

STANDARD OF PRACTICE HS-18 - HEALTH AND SAFETY CHECKLIST

Date: 05/01/00

Note: The following jobsite safety inspection checklist is to be used only at locations where CCI controls the work. It is not to be used at locations where others control the work.

Project Name: NAS Jacksonville. OU 3 Project No.: \_\_\_\_\_

Location: NAS Jacksonville Project Manager: Mike Halil

Inspector: \_\_\_\_\_ Date: \_\_\_\_\_

If an item is not applicable, the column titled "N/A" should be checked. If an item is applicable but the auditor does not observe it during the inspection, the "N/O" column should be checked. For each deficiency noted, a Health and Safety Audit Finding Form must be completed. The NAVY RAC Health and Safety Manager must be copied on the results of all audits.

Check "Yes" for Items Completed

Yes No N/A N/O

**I. JOBSITE OFFICE**

1. Posters and safety signs in place:				
a. OSHA safety poster	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Emergency Telephone Number Form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Workers Compensation Form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. First aid kit:				
a. Fully stocked/sufficient supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. First-aid administered by a person with a valid certificate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Bloodborne-pathogen kit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Accident/injury reporting:				
a. Employees briefed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Forms available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Injuries and illnesses reported and logged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Accidents investigated and properly followed up to prevent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Accident reports and logs submitted promptly as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Job safety rules and regulations available/posted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**II. HAZARD COMMUNICATION**

1. Employee training:				
a. Employees' signed training certificates on file	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Material safety data sheets (MSDSs):				
a. MSDSs on file	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Log assigned to competent person	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Log complete and up to date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Written program on file	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>III. EMPLOYEE TRAINING</b>				
1. Site personnel have read the job safety rules and regulations and have signed the "Employee Signoff Sheet"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Sufficient instruction given in recognition and avoidance of job hazards; unsafe conditions; and job rules, regulations, and procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Sufficient instruction in proper use and maintenance of tools, equipment, and personal protective equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Employees instructed to report unsafe or hazardous conditions to proper job supervisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Employees instructed to promptly report injury, illness, and accidents involving damage to equipment and materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Safety indoctrination held for new employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>IV. JOBSITE LOGISTICS AND LAYOUT</b>				
1. Traffic routes around construction areas:				
a. Warning signs, flagging in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Trucks and heavy equipment:				
a. Good mechanical conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Backup signals working	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Seat belts installed and used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>V. PUBLIC PROTECTION</b>				
1. Warning signs in place around site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VI. HOUSEKEEPING</b>				
1. Material storage yard:				
a. Stacked neatly and properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Aisles, walkways, roads clear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Check work areas for:				
a. Loose and waste materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Empty bottles, containers, papers, trash, bands, brick-bats, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Trash cans, dumpsters available and emptied regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Nails, boards, debris removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**VII. PERSONAL PROTECTIVE EQUIPMENT (PPE)**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Hard hats  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Safety shoes/boots   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Eye/face protection  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Safety belts/lanyards  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Ear protection:  |                          |                          |                          |                          |
| a. Noise level areas of 90 dBA and above identified   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Signs notifying personnel of "Hearing Protection Required" posted                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Specialized equipment:   |                          |                          |                          |                          |
| a. Gloves   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Chemical-Respirators (respirator use requires medical protocol, monitoring and training) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Chemical-resistant clothing/Hip waders   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Tools:   |                          |                          |                          |                          |
| a. Handles in good shape  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Tool guards in place   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**VIII. SANITATION**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Temporary toilets:   |                          |                          |                          |                          |
| a. Serviced regularly   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Sufficient Quantity (20 or fewer employees - 1 required;<br>20 or more employees - 1 toilet and 1 urinal per 40 workers) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Potable Water:   |                          |                          |                          |                          |
| a. Tightly closed containers  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Equipped with tap  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Paper cups available   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Containers labeled "Drinking Water"  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**IX. FLOOR AND WALL OPENINGS GUARDS****XI. SCAFFOLDING****XII. ELECTRICAL**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Cords/devices have current inspection color code tape installed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Frayed cords, broken plugs fixed                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Temporary wiring:   |                          |                          |                          |                          |
| a. Panels secured and GFCIs working                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Away from vehicle pathways                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- c. Out of water/moisture
- d. No broken receptacles found
- e. Sufficient outlets for all crafts
- 4. Temporary lighting with cages
- 5. Assured equipment grounding conductor program in place, if not using GFCIs
- 6. Lock-out or tag-out system used when necessary
- 7. Electrical dangers posted and guarded
- 8. Fire hazards checked, proper extinguishers available
- 9. Only qualified electricians work on electrical circuits and equipment
- 10. Cords passing through work areas must be covered or elevated to protect them from damage
- 11. Extension cords must be hard or extra-hard usage

**XIII. TEMPORARY HEATERS**

**XIV. FIRE PROTECTION**

- 1. Office fire extinguisher in working order and inspected regularly
- 2. One extinguisher, 2A rating, for each 3,000 square feet of protected area
- 3. One extinguisher, 2A rating, on each floor adjacent to each stairway
- 4. Trash, paper, other combustibles picked up
- 5. Welders/roofers have extinguishers nearby and a fire watch is available if needed
- 6. Fire alarm available/fire evacuation plan
- 7. "No Smoking" signs posted and enforced where necessary
- 8. Supervisors and employees trained in proper use of extinguishers

**XV. MATERIAL STORAGE AND HANDLING**

- 1. Neat storage area, clear passageways
- 2. Materials spotted to minimize rehandling and reduce transport distances
- 3. Power equipment used to handle heavy/awkward loads

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. Stacks on firm footing and all tier stacked materials secured against sudden movement          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Storage platforms, skids, bins, shelves, etc. in good repair                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Protruding nails and wires removed and rugged metal edges protected before material is handled | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Lifting weights known before handling  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Employees using proper lifting methods, picking up loads correctly                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Proper number of employees for each operation, physically suited for task                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Tag lines used to control loads   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Protection provided against falling hazards   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Dust protection observed  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Extinguishers or other fire protection available  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Combustibles, flammable, and other unrelated materials separated and clearly identified       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. "No Smoking" signs posted where necessary   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Safe loading limits observed for indoor storage   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**XVI. DEMOLITION WORK**

**XVII. STEEL ERECTION**

**XX. FLAMMABLE AND COMBUSTIBLE LIQUIDS**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Containers clearly marked to show contents (gas cylinders, cans, etc.)                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Proper storage practices observed:   |                          |                          |                          |                          |
| a. Storage areas enclosed or protected from heat and mobile equipment exposure                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Fire hazards checked   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Sufficient fire extinguishers  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. UL approved safety cans for 1 to 5 gallons of flammable liquids  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Approved cabinet for indoor storage of liquids in excess of 25-gallons, but not more than 120-gallon storage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Sign labeled "Flammable - Keep Fire Away" posted on cabinet  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**XXI. FLAMMABLE GAS (Oxygen/Acetylene)**

**XXII. WELDING OPERATIONS**

**XXIII. HOISTS**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Material hoists:                           |                          |                          |                          |                          |
| a. Designed by licensed professional engineer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| b. With tower enclosed for full height on all sides with 1/2-inch by 18--inch Gauge screen mesh, except for landing for landing access   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. With tower not enclosed, hoist platform or car will be totally enclosed on all sides for the full height between floor and overhead covering with 1/2-inch x 14-inch gauge mesh | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Operation rules poster "No Riders Allowed" posted   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Hoisting entrances guarded by substantial gate or bars  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Vertical gates of sufficient height to prevent anyone from looking over them into shaft   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Competent person assigned to inspect daily  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. Weekly inspections logged   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| I. Annual inspection available   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j. Fire extinguisher in place and inspected  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k. Load chart posted   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**XXIV. BLASTING**

**XXV. HAZARDOUS WASTE**

**Certification and Training of CH2M HILL Personnel**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Medical exam within last 12 months  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. First aid and CPR certification   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Attend pre-entry safety meeting   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Safety Coordinator with appropriate training  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Certification and Training of Subcontractor Personnel**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Medical exam within last 12 months  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. First aid and CPR certification   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Attend pre-entry safety meeting   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Site Safety Documentation**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Site health and safety plan (HSP) prepared and approved | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. HSP onsite  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. All personnel onsite identified in HSP                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. Documentation of safety briefing   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Hospital map posted  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Phone numbers posted   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Emergency vehicle identified   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Material Safety Data Sheets (MSDSs) onsite   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Work zones delineated<br>(How? _____)  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Wind direction flags in use   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Documentation of calibration of monitoring equipment in<br>Clean environment      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Monitoring conducted and recorded as specified in HSP<br>(Frequency? _____)       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Monitoring for heat/cold stress   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Buddy system in use   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Decontamination procedures established as specified in HSP                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. No eating, drinking, or smoking in exclusion and contamination<br>Reduction zones | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Toilet facilities provided  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. No contact lenses   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Work conducted during daylight hours only   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <b><u>Safety Briefing</u></b>   |                          |                          |                          |                          |
| 1. All personnel attended (including new personnel)                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Documentation of meetings  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Chemical hazards and toxicology reviewed   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Physical hazards reviewed  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Biological hazards reviewed  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Heat/cold stress information reviewed  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Air monitoring requirements  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 8. Levels of protection reviewed
- 9. Work zones reviewed
- 10. Decontamination procedures reviewed
- 11. Emergency response procedures reviewed
- 12. Site communications

**Personal Protective Equipment (PPE)**

- 1. Levels of protection being worn as specified in HSP
- 2. All appropriate PPE available onsite
- 3. Hard hats being worn
- 4. Appropriate hand protection being used  
(What? \_\_\_\_\_ )
- 5. Appropriate body protection being used  
(What? \_\_\_\_\_ )
- 6. Appropriate eye protection being used  
(What? \_\_\_\_\_ )
- 7. Appropriate ear protection being used
- 8. Personnel Flotation Devices for water work
- 9. Respirators donned correctly
- 10. Hip Waders for in water work
- 11. If PPE is not onsite, prepared to halt work
- 12. Disposal methods in place for disposable PPE

**Decontamination Procedures**

- 1. Decontamination procedure established as specified in the HSP
- 2. Decontamination zone clearly defined
- 3. PPE properly decontaminated  
(How? \_\_\_\_\_ )
- 4. Sampling equipment properly decontaminated  
(How? \_\_\_\_\_ )

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 5. Monitoring equipment properly decontaminated<br>(How? _____ ) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Heavy equipment properly decontaminated<br>(How? _____ )      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Samples properly decontaminated<br>(How? _____ )              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Decontamination fluids appropriately disposed of              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**XXVI. CONSTRUCTION INSPECTIONS**

**XXVII. OFFICE TRAILERS/BUILDINGS**

**Employer Posting**

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Is the OSHA (or state) job safety poster displayed in a prominent location where all employees are likely to see it?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Are emergency telephone numbers posted where they can be readily found in case of emergency?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Where employees may be exposed to any toxic substances or harmful physical agents, has appropriate information concerning employee access to medical and exposure records and Material Safety Data Sheets been posted or otherwise made readily available to affected employees? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Are signs concerning exits, room capacities, floor loading, exposure to x-ray, microwave, or other harmful radiation or substances posted appropriately?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Are other required posters properly displayed, such as:  |                          |                          |                          |                          |
| a. Industrial Welfare Commission orders regulating wages, hours, and working conditions?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Discrimination in employment prohibited by law?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Notice to employees of unemployment and disability insurance.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Payday notice?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Emergency Action Plan**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Are alarm systems properly maintained and tested regularly?     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is the emergency action plan reviewed and revised periodically? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Do employees know their responsibilities:                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| a. For reporting emergencies?                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. During an emergency?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. For conducting rescue and medical duties?                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Fire Protection**

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Is there a current fire prevention plan?                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Does the plan describe the type of fire protection equipment and/or | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 3. Are practices and procedures established to control potential fire hazards and ignition sources?
- 4. Is local fire department well acquainted with facilities, location, and specific hazards?
- 5. Is there a fire alarm system and is it certified as required?
- 6. If you have a fire alarm system, is it tested at least annually?
- 7. Are fire doors and shutters in good operating condition?
- 8. Are automatic sprinkler system water control valves, air and water pressures checked weekly/periodically as required?
- 9. Is maintenance of automatic sprinkler systems assigned to responsible persons or to a sprinkler contractor?
- 10. Is an earthquake preparedness kit on site?

**Exiting or Egress**

- 1. Are all exits marked with an exit sign and illuminated by a reliable light source?
- 2. Are the directions to exits, when not immediately apparent, marked with visible signs?
- 3. Are doors, passageways, or stairways that are neither exits nor access to exits and which could be mistaken for exits, appropriately marked "NOT AN EXIT," "TO BASEMENT," "STOREROOM," etc.?
- 4. Are exit doors side-hinged?
- 5. Are all exits kept free of obstructions?
- 6. Where exiting will be through frameless glass door, glass exit doors, etc., are the doors fully tempered, and do they meet the safety requirements for human impact?
- 7. Are special precautions taken to protect employees during construction and repair operations?
- 8. Are there sufficient exits to permit prompt escape in case of emergency?

**General Work Environment**

- 1. Are all work sites clean and orderly?
- 2. Are work surfaces kept dry or appropriate means taken to assure the surfaces are slip-resistant?
- 3. Are all spilled materials or liquids cleaned up immediately?
- 4. Are all work areas adequately illuminated?

**Walkways**

- 1. Are aisles and passageways kept clear?

**Medical Services And First Aid**

- 1. If medical and first aid facilities are not in proximity to your workplace, is At least one employee on each shift currently qualified to render first aid?

- 2. Are medical personnel readily available for advice and consultation on Matters of employee health?
- 3. Have first aid kit supplies been approved by a physician, indicating they are adequate for a particular area or operation?
- 4. Are first aid kits easily accessible to each work area, with necessary Supplies available, periodically inspected, and replenished as needed?
- 5. Are emergency phone numbers posted?

**XXIII. CONFINED SPACE ENTRY**

**XXIX. STAIRWAYS AND LADDERS**

**XXX. FALL PROTECTION**

**XXXI. EXCAVATIONS**

**XXXII. DRILLING**

**Personnel Safe Work Practices. (3.1)**

- 1. Only authorized personnel operating drill rig.
- 2. Personnel cleared during rig startup.
- 3. Personnel clear of rotating parts.
- 4. Personnel not positioned under hoisted loads.
- 5. Loose clothing and jewelry removed.
- 6. Personnel instructed not to approach equipment that has become electrically energized.
- 7. Smoking is prohibited around drilling operation.
- 8. Personnel wearing appropriate PPE, per HSP.

**General (3.2.1)**

- 9. Daily safety briefing/meeting conducted with crew.
- 10. Daily inspection of drill rig and equipment conducted before use.

**Drill Rig Placement (3.2.2)**

- 11. Location of underground utilities identified.
- 12. Safe clearance distance maintained from overhead powerlines.
- 13. Drilling pad established, when necessary.
- 14. Drill rig leveled and stabilized.

**Drill Rig Travel (3.2.3)**

- 15. Rig shut down and mast lowered and secured prior to rig movement.
- 16. Tools and equipment secured prior to rig movement.
- 17. Only personnel seated in cab are riding on rig during movement.

- 18. Safe clearance distance maintained while traveling under overhead powerlines.
- 19. Backup alarm or spotter used when backing rig.
- Drill Rig Operation (3.2.4)**
- 20. Kill switch clearly identified and operational.
- 21. All machine guards are in place.
- 22. Rig ropes not wrapped around body parts.
- 23. Pressurized lines and hoses secured from whipping hazards.
- 24. Drill operation stopped during inclement weather.
- 25. Air monitoring conducted per HSP for hazardous atmospheres.
- 26. Rig placed in neutral when operator not at controls.
- Drill Rig Maintenance (3.2.5)**
- 27. Defective components repaired immediately.
- 28. Lockout/tagout procedures used prior to maintenance.
- 29. Cathead in clean, sound condition.
- 30. Drill rig ropes and wire lines in clean, sound condition
- 31. Fall protection used for exposures > 6'.
- 32. Rig in neutral and augers stopped rotating before cleaning.
- 33. Good housekeeping maintained on and around rig.
- Drilling at Hazardous Waste Sites (3.2.6)**
- 34. Waste disposal according to HSP and Environmental Protection Plan.
- 35. Appropriate decontamination procedures followed, per HSP>

**XXXIII. EARTHMOVING EQUIPMENT**

**XXXIV. DEMOLITION**

**XXXVI. HAND AND POWER TOOLS**

**SAFE WORK PRACTICES (3.1)**

- 1. All tools operated according to manufacture's instructions.
- 2. All hand and power tools maintained in a safe condition and inspected before each use.
- 3. Defective tools are tagged and removed from service until repaired.
- 4. PPE is selected and used according to tool-specific hazards.

- 5. Power tools are not carried or lowered by cord or hose.
- 6. Tools are disconnected from energy sources when not in use.
- 7. Safety guards remain installed or are promptly replaced after repair.
- 8. Tools are stored properly.
- 9. Cordless tools and recharging units conform to electrical standards.
- 10. Tools used in explosive environments are rated for such use.
- 11. Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stresses.
- 12. Knife or blade hand tools are used with the proper precautions.
- General (3.2.1)**
- 13. PPE is selected and used according to tool-specific hazards anticipated.
- 14. Tools are tested daily to assure safety devices are operating properly.
- 15. Damaged tools are removed from service until repaired.
- 16. Power operated tools designed to accommodate guards and used.
- 17. Rotating or moving parts on tools are properly guarded.
- 18. Machines designed for fixed locations are secured or anchored.
- 19. Floor and bench-mounted grinders are provided with work rests.
- 20. Guards are provided at point of operation, nip points, rotating parts.
- 21. Fluid used in hydraulic-powered tools is approved fire-resistant fluid.
- Electric-Powered Tools (3.2.2)**
- 22. Electric tools are double insulated or grounded according to SOP HS-23.
- 23. Electric cords are not used for hoisting or lowering tools
- 24. Hand-held tools are equipped with appropriate on/off controls.
- 25. Electric tools used in damp/wet locations are approved or use GFCI.