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BASEWIDE HEALTH AND SAFETY PLAN MILLINGTON SUPPACT TN
4/1/2001
CH2MHILL CONSTRUCTORS

Basewide Work Plan

Revision No. 01

Naval Support Activity Mid-South Millington, Tennessee

Contract No. N62467-98-D-0995

April 2001

PREPARED FOR



Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

**Basewide Health and Safety Plan
Naval Support Activity Mid-South
Millington, Tennessee**

Revision No. 00

**Contract No. N62467-98-D-0995
Contract Task Order No. 0055**

Revision 00

Submitted to:

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

Prepared by:



CH2MHILL
Constructors, Inc.

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

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Suite 700
Atlanta, GA 30346

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Prepared/Approved By:

Matt Haupt, Project Manager

Date

Approved By:

R. Scott Newman, Program Manager

Date

Client Acceptance:

U.S. Navy Responsible Authority

Date

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Acronym List (Continued)

IDW	investigation derived waste
IR CDQM	Installation Restoration Chemical Data Quality Manual
IRP	Installation Restoration Program
LCS	lab control sample
LEL	lower explosive limit
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MRD	Missouri River District
MS/MSD	matrix spike/matrix spike duplicate
MSDS	Material Safety Data Sheet
MSHA	Mine Safety Health Administration
msl	mean sea level
MTBE	methyl tert-butyl ether
NAVFAC	Naval Facilities Engineering Command
NEDTS	Navy Environmental Data Transfer Standard
NFESC	Naval Facilities Engineering Services Command
NIOSH	National Institute of Occupational Safety and Health
NOSC	Navy On-Scene Coordinator
NPDES	National Pollutant Discharge Elimination System
NSA	Naval Support Activity
NTR	Navy Technical Representative
NWS	Naval Weapons Station
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PAT	Proficiency Analytical Testing
PCB	polychlorinated biphenyl
PE	performance evaluation
PID	photoionization detector
PM	Project Manager
PMO	Program Management Office
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
ppm	parts per million
PQCM	Program Quality Control Manager
PQL	practical quantitation limit
psi	pounds per square inch
PVC	polyvinyl chloride
QA	Quality Assurance
QAM	quality assurance manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Program Plan
QC	Quality Control
QCM	Quality Control Manager
QCPP	Quality Control Program Plan

Acronym List (Continued)

RAC	Remedial Action Contract
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
ROPS	rollover project structures
RPD	relative percent difference
SHSS	Site Health and Safety Specialist
SPM	Program Senior Project Manager
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
TQL	total quality leadership
TRPH	total recoverable petroleum hydrocarbons
TSSDS	Tri-Service Spatial Data Standard
TWA	time weighted average
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USN	United States Navy
UST	underground storage tank
VOC	volatile organic compounds
WS/WP	water supply/water pollution

1.0 Introduction

CH2M HILL Constructors, Inc. (CCI) has been contracted by the Department of the Navy, Southern Division, Naval Facilities Engineering Command (Southern Division, NAVFAC), to prepare this Basewide Work Plan for work to be performed by CCI at Naval Support Activity (NSA) Mid-South, Millington, Tennessee. The work is being performed under Contract No. N62467-98-D-0995 and in accordance with the management approach outlined in the CCI Contract Management Plan (CMP) dated July 1998.

The purpose of this Basewide Work Plan is to describe the generic efforts necessary to perform environmental remediation services at NSA Mid-South. Components of this work may include the following: underground storage tank (UST)/aboveground storage tank (AST) removal; soil and free product removal; sampling and analysis; transportation and disposal of wastes; site restoration following work activities; installation of soil and groundwater remediation systems; and operation and maintenance of those systems. This document serves as the Basewide Work Plan that outlines the fundamental plans and requirements for completion of these activities at NSA Mid-South. Necessary site-specific information for each Contract Task Order (CTO) or project issued at NSA Mid-South will be provided to the Southern Division in CTO-specific work plan addenda which are intended to supplement this Basewide Work Plan.

This Basewide Work Plan is organized into six sections of text and seven appendices. A brief description of each section is presented below.

1.0 Introduction of this Basewide Work Plan contains a brief description of the reporting requirements. The CTO-specific work plan addenda will include a description of the site history, the required scope of work, and individual project schedule.

2.0 Sampling and Analysis Plan provides the sample collection and analysis methodology including sample handling, labeling, and required collection of quality assurance and quality control samples. Each CTO-specific work plan addenda will provide the specific project sample locations, sample collection frequency, and the required laboratory analyses and turnaround times.

3.0 Wastestream Management Plan discusses the characterization, disposal, handling, and transportation of wastes encountered or generated during the work completed at NSA Mid-South. If hazardous waste is expected during site-specific project activities, the CTO-specific work plan addenda will address the characterization and management of those hazardous materials.

4.0 Environmental Protection Plan addresses the various methods that CCI will employ in order to eliminate or minimize any potential impacts to the environment while performing the work.

5.0 Site Health and Safety Plan (HSP) addresses basewide health and safety requirements for the project construction activities anticipated at NSA Mid-South. These requirements will be in accordance with Appendix A of the CMP. CTO-specific work plan addenda will

address any health and safety issues not specifically discussed in this plan. The Basewide HSP is presented as a stand-alone document in Appendix E of this Basewide Work Plan.

6.0 Quality Control Plan details the quality administrators, the project organization, and the definable features of work for each project site. The CTO-specific work plan addenda will outline any additional site-specific features of work not addressed in this Basewide Work Plan. In addition, a Submittal Register that documents quality control for materials, inspections, and testing will be completed in accordance with Appendix B of the CMP and will be included in the CTO-specific work plan addenda.

The following support documents are presented as appendices to this Basewide Work Plan:

- Appendix A Health and Safety Plan
- Appendix B Sampling and Analysis Form
- Appendix D Waste Management Forms
- Appendix E Quality Control Forms

Each CTO-specific work plan addenda may include additional sections such as Technical Specifications containing site-specific additions and modifications to the project's technical specifications. The addenda may also include Contractor Generated Construction Drawings containing the site-specific design drawings such as any site plan, piping and instrumentation diagrams, construction details, etc., applicable to the particular project. Further, Section 1.0 Introduction (provided in the work plan addenda) will include the following site-specific information: Site History and Project Objectives, and Scope of Work.

1.1 Project Schedule

The CTO-specific work plan addenda will provide a site-specific project schedule outlining the primary construction activities.

Similar onsite construction activities will be completed concurrently at the different project locations. All activities will be coordinated with base personnel to minimize any operational conflicts.

1.2 Reporting

A list of deliverables and their anticipated submittal dates as part of the basewide requirement is provided in Table 1-1.

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

TABLE 1-1
Submittals and Delivery Dates

Deliverables	Submittal Date(s)
Design Drawings	Submitted with each CTO-specific work plan addendum. Marked sets of as-built construction drawings will be delivered to the NTR at each project's completion
Permits	Obtain where necessary
Environmental Conditions Report	2 weeks prior to construction
CPM Schedule	Within 30 days of work plan approval
Status Reports	Delivered 15 th of following month to report previous month
QC Meeting Minutes	2 calendar days after each QC meeting
Contractor Production Report	Daily
Contractor Quality Control Report	Daily
Rework Items List	Monthly during field operations
Contractor's Closeout Report	Project completion
Test Results Summary Reports	Within 30 days of laboratory receipt of samples

CCI will prepare an Environmental Conditions Report for each project prior to the commencement of construction (see Section 4.9). Photographs of the pre-construction condition of the work site will be incorporated into the Report (see Section 6.5.2.8). Additional pictures of items such as roads, sidewalks, storage areas, and staging areas will also be included. Copies of the Environmental Conditions Report will be submitted to the NTR within 2 weeks of the start of construction.

As part of the Contract Management System (CMS), the Network Analysis Diagram and the Monthly Status Report provide an ongoing tracking system designed to limit project pitfalls and to monitor project activities and upcoming events. The information required in the Monthly Status Report will be submitted in accordance with Section C, Part 2.4 of the basic contract.

Copies of the minutes from QC meetings will be delivered to the NTR within 2 calendar days after each meeting. Contractor Production Reports will be completed by the Site Superintendent for each day that work is performed onsite. These daily reports will document the specific work performed and key project events.

Contractor Quality Control Reports are required to be completed by the Project QC Manager for each day that work is performed onsite (see Section 6.5.2.2). These daily reports identify the control phase, the definable feature of work, meetings held, approved submittals, compliance with material usage and storage, field testing completed, and work methods and schedule. Section 6.0 Quality Control Plan identifies the QC requirements for this work.

A Rework Items List will document the work that does not comply with the CTO (see Section 6.5.2.6). The list includes the items that need to be reworked, the discovery date of the reworked items, and the date that they were corrected. The Rework Items List will be maintained by the QC Manager and will be submitted with the last daily Contractor Quality Control Report of each month.

Any permits identified in the scope of work will be obtained by CCI or its subcontractor(s), including any required well permits.

A summary report of all field tests and laboratory analytical results will be submitted to the NTR within 30 days after laboratory receipt of the samples and in accordance with Section C, Part 6.4 of the basic contract.

At the completion of each project, CCI will submit a Contractor's Closeout Report. This report will include an introduction, summary of project activities, final health and safety report, summary of record documents, field changes and contract modifications, complete set of data validation results, documentation of offsite transportation and disposal of materials, and Quality Control (QC) summary report. A table of contents for the Contractor's Closeout Report will be submitted and approved by the NTR prior to preparation of the report.

1.3 Government Furnished Property

CCI anticipates that government-furnished property will not be required during any of the projects completed at NSA Mid-South. However, any equipment, materials, or other items purchased by the Navy for any of the projects will remain the property of the Navy following completion of the specific project. The items will either be turned over to the ROICC or will remain with CCI to be used on other CTOs issued under this contract. An inventory of these items will be maintained by CCI to track items that remain with CCI. Property management will be conducted in accordance with Section 3.10 of the CMP.

1.4 Communications Plan

The organizational structure and lines of communications for a participating CTO will be included in the work plan addendum for each CTO.

2.0 Sampling and Analysis Plan

This Sampling and Analysis Plan (SAP) presents the policies, procedures, functions, and QA/QC requirements designed to achieve the data quality goals for NSA Mid-South under Contract Number N62467-98-D-0995 for the Southern Division, NAVFAC. This SAP integrates the required components of a Quality Assurance Project Plan (QAPP) and a Field Sampling Plan (FSP). The work plan addenda will detail the site-specific sampling and analytical requirements. This basewide SAP has been prepared to ensure 1) the data quality objectives (DQOs) for the base are met, 2) the field sampling protocols are documented and reviewed in a consistent manner, and 3) the data collected are scientifically valid and defensible.

All staff participating in the work effort are required to read this SAP. The SAP will be in the possession of the field teams collecting the samples. All contractors and subcontractors will be required to comply with the procedures documented in this SAP in order to maintain comparability and representativeness of the collected and generated data.

Controlled distribution of the SAP will be implemented by CCI to ensure the current approved version is being used. A sequential numbering system will be used to identify controlled copies of the SAP. Controlled copies will be provided to applicable Navy representatives, regulatory agencies, remedial project managers, project managers, and quality assurance (QA) coordinators. Whenever revisions are made or addenda added to the SAP, a document control system will be put into place to assure: 1) all parties holding a controlled copy of the SAP will receive the revisions/addenda and 2) outdated material is removed from circulation. The document control system does not preclude making and using copies of the SAP; however, the holders of controlled copies are responsible for distributing additional material to update any copies within their organizations. The distribution list for controlled copies will be maintained by the CCI.

The various types of environmental samples collected during the execution of each project may include confirmation samples, waste characterization samples, remediation system samples, groundwater monitoring well samples, incidental wastestream samples, field screening, and construction testing.

Confirmation samples (a.k.a. verification samples) are collected and analyzed to evaluate the limits of a soil excavation. Waste characterization samples are collected and analyzed to evaluate the required management, transportation, and disposal requirements for any wastestream generated during a project. Remediation system samples are collected and analyzed to evaluate the effectiveness or efficiency of a treatment system. Groundwater monitoring well samples collected and analyzed during the operation of a groundwater treatment system are used to evaluate the treatment system performance and to characterize the movement and magnitude of the groundwater contaminant plume. Incidental wastestream samples are collected and analyzed to properly characterize management, transportation, and disposal requirements for any incidental wastestream, such as decontamination water, generated during project construction or operation and maintenance activities.

All sampling and analyses will be performed in accordance with the USEPA Region IV Environment Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), May 1996, including 1997 revisions. In addition, the Naval Facilities Engineering Service Center (NFESC) Installation Restoration Chemical Data Quality Manual (IR CDQM), September 1999, will be used as guidance for issues not addressed in the EISOPQAM.

2.1 Field Operations

2.1.1 Site Reconnaissance, Preparation, and Restoration Procedures

Areas designated for intrusive sampling will be surveyed for the presence of underground utilities. Utility locations are determined using existing utility maps, and in the field, are verified using a hand-held magnetometer or utility probe. Vehicle access routes to sampling locations will be determined prior to any field activity.

A centralized decontamination area will be provided for drilling rigs and equipment. The decontamination area will be large enough to allow storage of cleaned equipment and materials prior to use, as well as to stage drums of decontamination waste. As shown on Figure 2-1, the decon area will be located no more than 35 feet from the excavated drum location. The decontamination area will be lined with heavy gauge plastic sheeting, and designed with a collection system to capture decontamination waters. Solid wastes will be accumulated in 55-gallon drums and subsequently transported to a temporary waste storage area until final disposition. Smaller decontamination areas for personnel and portable equipment will be provided as necessary. These locations will include basins or tubs to capture decontamination fluids, which will be transferred into 55-gallon drums or a large accumulation tank as necessary. These designated areas of decontamination will be delineated on the site maps.

Field office sites will be designated and shown on the site maps. Each work site or sampling location will be returned to its original condition when possible. Efforts will be made to minimize impacts to work sites and sampling locations, particularly those in or near sensitive environments such as wetlands. Following the completion of work at a site, all drums, trash, and other waste will be removed. Decontamination and/or purge water and soil cuttings will be transported to the designated locations until final disposition.

2.1.2 Borehole Drilling, Sampling, Logging, and Abandonment

2.1.2.1 General Borehole Drilling Procedures

All drilling activities will conform with state and local regulations and will be supervised by a state licensed geologist or state licensed engineer. The drilling subcontractor will obtain and pay for all permits, applications, and other documents required by state and local authorities.

The location of all borings will be coordinated, in writing, with the CCI before drilling commences. When drilling boreholes through more than one water-bearing zone or aquifer, measures will be taken to prevent cross-connection or cross-contamination of the zones or aquifers.

The drill rig will be cleaned and decontaminated in accordance with (IAW) the procedure in Section 2.3. The drill rig will not leak any fluids that may enter the borehole or contaminate equipment placed in the hole. The use of rags or absorbent materials to absorb leaking fluids is unacceptable.

Drilling fluids will consist of air, water, or mud. If air is used, it will be filtered to remove organic vapors, and filters will be changed daily. The effectiveness of the air filter will be checked at least every 4 hours using a photoionization detector (PID) or flame ionization detector (FID). If organic vapors are detected in air passing through the downstream end of the air line or drill stem, their source (i.e., filter, contaminated line, etc.) will be decontaminated or replaced. If water is used, the subcontractor will provide chemical analyses of the water for CCI approval. Only water from a pre-approved source will be used as a drilling fluid and the water quality will be monitored daily for suspected analytes of concern. Drilling mud, if used, will consist of 100 percent sodium bentonite and will be approved by the CCI. The subcontractor will provide CCI with the chemical analyses of any drilling mud additive or substitute proposed for use prior to the start of drilling. The additives or substitutes will be analyzed for all analytes of concern at the site. The analyses will be delivered to the CCI for written approval prior to drilling system mobilization. Mud or other additives will only be used as a last resort.

Lubricants will not introduce or mask contaminants. The subcontractor will provide chemical analyses of all lubricants proposed for downhole use. Chemical detection limits will be equivalent to those used in analyzing project ground-water samples. Lubricants with constituents that are toxic or that increase, decrease, or mask the target chemical species of the investigation will not be permitted. The subcontractor will provide the analysis results to the CCI prior to drilling mobilization.

A log of drilling activities will be kept in a bound field notebook. Information in the logbook will include location, time onsite, personnel and equipment present, down time, materials used, samples collected, measurements taken, and any other observations or information that would be necessary to reconstruct field activities at a later date. At the end of each day of drilling the drilling supervisor will complete a daily drilling log.

The subcontractor will dispose of all trash, waste grout, cuttings, and drilling fluids as coordinated with the CCI.

2.1.2.2 Sampling and Logging

The lithology in all boreholes will be logged. The boring log form, included in Appendix B will be used for recording the lithologic logging information. Information on the boring log sheet includes the borehole location; drilling information; sampling information such as sample intervals, recovery, and blow counts; and sample description information.

Unconsolidated samples for lithologic description will be obtained at each change in lithology or every 5-foot interval, whichever is less or as specifically stated in the Statement of Work (SOW). Lithologic descriptions of unconsolidated materials encountered in the boreholes will generally be described in accordance with American Society for Testing and Materials (ASTM) D-2488-90 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM, 1990). Descriptive information to be recorded in the field will include:

- Identification of the predominant particles size and range of particle sizes
- Percent of gravel, sand, fines, or all three
- Description of grading and sorting of coarse particles
- Particle angularity and shape
- Maximum particle size or dimension

Plasticity of fines description include:

- Color using Munsell Color System
- Moisture (dry, wet, or moist)
- Consistency of fine grained soils
- Structure of consolidated materials
- Cementation (weak, moderate, or strong)

Identification of the Unified Soil Classification System (USCS) group symbol will be used. Additional information to be recorded includes the depth to the water table, caving or sloughing of the borehole, changes in drilling rate, depths of laboratory samples, presence of organic materials, presence of fractures or voids in consolidated materials, and other noteworthy observations or conditions, such as the locations of geologic boundaries.

All samples will be monitored with an organic vapor monitor (e.g., organic vapor analyzer [OVA] or PID). The samples will be handled in such a way as to minimize the loss of volatiles. Cuttings will be examined for their hazardous characteristics. Materials suspected to be hazardous because of abnormal color, odor, or organic vapor monitor readings will be containerized in conformance with the Resource Conservation and Recovery Act (RCRA) and the state and local requirements. Rock cores will be stored in standard core containers, and missing sections of core will be replaced with spacers.

2.1.2.3 Borehole Abandonment

Boreholes that are not converted to monitor wells will be abandoned in accordance with applicable federal, state or local requirements. If a slurry is used, a mud balance and/or Marsh Funnel will be used to ensure the density (in pounds per gallon [lbs/gal]) of the abandonment mud mixture conforms with the manufacturer's specifications. The slurry will be emplaced from the bottom to the top of the hole using a tremie pipe.

All abandoned boreholes will be checked 24 to 48 hours after mud/solid bentonite emplacement to determine whether curing is occurring properly. More specific curing specifications may be recommended by the manufacturer and will be followed. If settling has occurred, a sufficient amount of mud/solid bentonite will be added to fill the hole to the ground surface. These curing checks and any addition of mud/solid bentonite will be recorded in the field log.

2.1.3 Monitor Well Construction

The onsite quality control (QC) officer will oversee the drilling, soil boring, geophysical surveys, lithologic sampling, and monitor well construction. The subcontractor's field manager supervising those tasks will be a state-licensed geologist, hydrogeologist, or geotechnical engineer, or will be certified by the American Institute of Hydrology, American Institute of Professional Geologists, or the National Ground Water Association as a Certified Ground Water Professional. The supervising field manager will affix his/her

signature and registration/ certification seal to all drilling logs, as-built well construction diagrams, lithologic logs, sampling records, and similar documents. When there is a possibility that floating petroleum products (i.e., light non-aqueous phase liquids [LNAPLs]) may be encountered, shallow monitor wells will be screened across the water table. The length of the screen will be such that tidal and seasonal water table fluctuations will not cause water levels to rise above or fall below the screened interval. If dense petroleum products (i.e., dense non-aqueous phase liquids [DNAPLs]) may be encountered, monitor wells will be screened at the bottom of the aquifer to capture the DNAPL.

2.1.3.1 Monitor Well Drilling Requirements

All drilling and well installations will conform to state and local regulations, and the subcontractor will obtain and pay for all permits, applications, and other documents required by state and local authorities. The location of all borings will be coordinated in writing with CCI before drilling commences.

The rig will be cleaned and decontaminated according to the guidelines described in Section 2.3. The rig will not leak any fluids that may enter the borehole or contaminate equipment that is placed in the hole. The use of rags or absorbent materials to absorb leaking fluids is unacceptable. The only acceptable drilling fluids are air, water, and mud. The air used will be filtered to remove organic vapors, and if water is used, the prime contractor will provide chemical analyses of the water showing the purity. The water quality will be monitored daily for suspected analytes of concern. The mud used will be 100 percent sodium bentonite. The contractor will provide chemical analyses of any drilling mud additive or substitute (e.g., foam, biodegradable material, etc.) proposed for use. The additives or substitutes for drilling will be analyzed for all analytes of concern at the site and they will be approved prior to drilling mobilization.

When air is used, the effectiveness of the air filter will be checked at least every four hours. The air passing through the downstream end of the air line will be monitored with an organic vapor monitor (e.g., PID, OVA), and if organic vapors are detected, their source (filter, contaminated line, etc.) will be decontaminated or replaced.

Drilling lubricants will not introduce or mask contaminants at the site. The subcontractor will provide, to CCI, chemical analyses of all lubricants proposed for downhole use prior to the start of drilling. Chemical detection limits will be equivalent to those used in analyzing the project groundwater samples. Lubricants with constituents that are toxic or that increase, decrease, or mask the target chemical species of the investigation will not be permitted. The subcontractor will provide the analysis results prior to drilling mobilization.

The subcontractor will dispose of all trash, waste grout, cuttings, and drilling fluids as coordinated with CCI. When installing wells through more than one water-bearing zone or aquifer, the contractor will take measures to prevent cross-connection or cross-contamination of the zones or aquifers.

2.1.3.2 Borehole Requirements

Borehole diameters will be at least 4 inches larger than the outside diameter of the casing and well screen. In the case of a hollow stem auger, the inside diameter of the auger will be at least 4 inches larger than the outside diameter of the casing and well screen. Variance from these requirements must be submitted to and approved by CCI.

A completed monitor well will be straight and plumb. The monitor well will be sufficiently straight to allow passage of pumps or sampling devices. The monitor well will be plumb within 1 degree of vertical where the water level is greater than 30 feet below land surface unless otherwise approved by CCI. CCI may waive a plumbness requirement, with the approval of the NTR. Any request for a waiver from straightness or plumbness specifications will be made, in writing, to CCI in advance of mobilization for drilling. The subcontractor will use a single-shot declination tool to demonstrate plumbness. Monitor wells not meeting straightness or plumbness specifications will be redrilled and/or reconstructed.

The documentation record and forms, included in Appendix B, will document the following information for each boring:

- Boring or well identification (this identification will be unique, and the CCI is responsible for ensuring it has not been used previously at the installation.)
- Purpose of the boring (e.g., soil sampling, monitor well)
- Location in relation to an easily identifiable landmark
- Names of drilling subcontractor and logger
- Start and finish dates and times
- Drilling method
- Types of drilling fluids and depths at which they were used
- Diameters of surface casing, casing type, and methods of installation
- Depth at which saturated conditions were first encountered
- Lithologic descriptions and depths of lithologic boundaries
- Sampling-interval depths
- Zones of caving or heaving
- Depth at which drilling fluid was lost and the amount lost
- Changes in drilling fluid properties
- Drilling rate
- Drilling rig reactions, such as chatter, rod drops, and bouncing

2.1.3.3 Casing Requirements

The following casing requirements will be followed:

- All casing will be new, unused, and decontaminated.
- Glue will not be used to join casing, and casings will be joined only with compatible welds or couplings that will not interfere with the planned use of the well.

- All polyvinyl chloride (PVC) will conform to the ASTM Standard F-480-88A or the National Sanitation Foundation Standard 14 (Plastic Pipe System).
- All metal casing will be seamless stainless steel casing, and the casing "mill" papers will be included in the appendix of the technical report.
- The casing will be straight and plumb within the tolerance stated for the borehole.
- The driller will cut a notch in the top of the casing to be used as a measuring point for water levels.

2.1.3.4 Well Screen Requirements

Well screen requirements are as follows:

- All requirements that apply to casing will also apply to well screen, except for strength requirements.
- Monitor wells will not be screened across more than one water-bearing unit.
- Screens will be factory slotted or wrapped.
- Screen slots will be sized to prevent 90 percent of the filter pack from entering the well. For wells where no filter pack is used, the screen slot size will be selected to retain 60 to 70 percent of the formation materials opposite the screen.
- The bottom of the screen is to be capped, and the cap will be joined to the screen by threads.

The subcontractor may propose open-hole wells in bedrock where cave-in is unlikely. Prior approval for such wells will be obtained, in writing, from CCI.

2.1.3.5 Annular Space Requirements

The annular space requirements are as follows:

- The annular space will be filled with a filter pack, a bentonite seal, and casing grout between the well string and the borehole wall
- Any drilling fluids will be thinned with potable water of known acceptable quality to a density less than 1.2 grams per cubic centimeter (g/cm^3) (10 lbs/gal) before the annular space is filled, and a mud balance or Marsh Funnel will be kept onsite to allow measurement of drilling fluid density.
- As the annular space is being filled, the well string will be centered and suspended such that it does not rest on the bottom of the hole, and for wells greater than 50 feet deep, at least two centralizers will be used, one at the bottom and one at the top of the screen. Additional centralizers will be used as needed.

2.1.3.6 Filter Pack Requirements

The filter pack will consist of silica sand or gravel and will extend from the bottom of the hole to at least 2 feet above the top of the well screen. After the filter pack is emplaced, the well will be surged with a surge block for ten minutes. The top of the sand pack will be

sounded to verify its depth during placement. Additional filter pack will be placed as required to return the level of the pack to 2 feet above the screen. Surge the well for 5 minutes. Again, place additional filter pack as required to bring its level to 5 feet above the screen. If gravel is used, 6 inches of coarse sand will be placed on top of the gravel.

The filter pack material will be clean, inert, and well-rounded and will contain less than 2 percent flat particles. The sand or gravel will be certified free of contaminants by vendor or contractor. If decontamination is necessary, the methods will be approved in writing by CCI.

The filter pack will have a grain size distribution and uniformity coefficient compatible with the formation materials and the screen, as described in Chapter 12, Ground Water and Wells, 2nd Edition, 1986. The filter pack will not extend across more than one water-bearing unit. In all wells (deep or shallow), the filter pack will be emplaced with a bottom-discharge tremie pipe of at least 1.5 inches in diameter. The tremie pipe will be lifted from the bottom of the hole at the same rate the filter pack is set. The contractor will record the volume of the filter pack emplaced in the well. Potable water may be used, with the approval of the regulatory agency providing oversight, to emplace the filter pack so long as no contaminants are introduced. The contractor may use formation materials as a filter pack when they are compatible with the slot size of the screen, such as in glacial outwash gravel deposits.

2.1.3.7 Bentonite Seal Requirements

Bentonite seal requirements are as follows:

- The bentonite seal will consist of at least 2 feet of bentonite between the filter pack and the casing grout.
- The bentonite will be hydrated before placement and will be installed by pump tremie methods.
- Only 100 percent sodium bentonite will be used.

For wells less than 15 feet, the subcontractor may propose alternate sealing methods. Prior approval for any alternate method will be obtained, in writing, from CCI before well construction begins.

2.1.3.8 Casing Grout Requirements

Casing grout requirements are as follows:

- The casing grout will extend from the top of the bentonite seal to ground surface.
- The grout will be mixed in the following proportions: 94 pounds of neat Type I Portland or American Petroleum Institute Class A cement, not more than 4 pounds of 100 percent sodium bentonite powder, and not more than 8 gallons of potable water.
- All grout will be pump tremied using a side-discharge tremie pipe, and pumping will continue until 20 percent of the grout has been returned to the surface to ensure the grout job is done properly and surface contaminants will not enter the annulus.

- In wells where the bentonite seal is visible and within 30 feet of the land surface, the 20 percent return is not necessary so long as the tremie pipe is pulled back as the grout is emplaced.
- The excess grout (20 percent) will be removed and cleaned from the site prior to installing the pad.

2.1.3.9 Surface Completion Requirements

For flush-mounted completions, the casing is cut approximately 3 inches below the land surface and provide a water-tight casing cap to prevent surface water from entering the well. To allow for escape of gas, a small diameter (e.g., 1/4-inch) vent hole will be placed in the upper portion of the casing, or a ventilated well cap will be used. A freely draining valve box with a locking cover will be placed over the casing. The top of the casing will be at least one foot above the bottom of the box. The valve box lid will be centered in a 3-foot diameter, 4-inch thick concrete pad that slopes away from the box at 1/4-inch per foot. The identity of the well will be permanently marked on the valve box lid and the casing cap. Where heavy traffic may pass over the well or for other reasons, the concrete pad and valve box/lid assembly will be constructed to meet the strength requirements of surrounding surfaces.

When aboveground surface completion is used, the well casing should extend 2 or 3 feet above land surface. A casing cap should be provided for each well, and the extended casing shielded with a steel sleeve that is placed over the casing and cap and seated in a 3-foot by 3-foot by 4-inch concrete surface pad. To allow for escape of gas, a small diameter (e.g., 1/4-inch) vent hole will be placed in the well casing, or a ventilated well cap will be used. The concrete surface pad will be reinforced with steel reinforcing bars at least 1/4-inch in diameter.

The ground surface will be freed of grass and scoured to a depth of 2 inches before setting the concrete pad. The diameter of the sleeve will be at least 6 inches greater than the diameter of the casing. Slope the pad away from the well sleeve. A lockable cap or lid will be installed on the guard pipe. The identity of the well will be permanently marked on the casing cap and the protective sleeve. Three 3-inch diameter concrete-filled steel guard posts will be installed. The guard posts will be 5 feet in total length and installed radially from each well head. The guard posts will be recessed approximately 2 feet into the ground and set in concrete. The guard posts will not be installed in the concrete pad placed at the well base. The protective sleeve and guard posts will be painted with a color specified by the installation civil engineer. In areas of extreme frost heaving, the concrete pads specified may not be appropriate, and alternate designs maybe required. Special consideration and approvals may be needed in cold climate areas.

All wells will be secured as soon as possible after drilling. Corrosion-resistant locks will be provided for both flush and aboveground surface completions. The locks must either have identical keys or be keyed for opening with one master key. The subcontractor will deliver the lock keys to the appropriate CCI personnel following completion of the field effort.

2.1.3.10 Piezometer Requirements

A piezometer is a small diameter cased borehole primarily used for water level measurements. Requirements are as follows:

- Piezometers will be constructed using methods or materials that do not contaminate groundwater or allow hydraulic communication between water-bearing units or between the ground surface and water-bearing units.
- Piezometers that penetrate more than one water-bearing unit will be constructed in a manner that allows fluid from only one unit to enter them.
- Straightness and plumbness of piezometers will be the same as for boreholes and monitor wells.

2.1.3.11 Well/Piezometer Completion Diagrams

A completion diagram will be submitted for each monitor well or piezometer installed. It will include the following information:

- Well identification (identical to the boring identification described)
- Drilling method installation date(s)
- Elevations of ground surface and the measuring point notch
- Total boring depth
- Lengths and descriptions of the screen and casing
- Lengths and descriptions of the filter pack, bentonite seal, casing grout, and any back-filled material
- Elevation of water surface before and immediately after development
- Summary of the material penetrated by the boring

2.1.4 Monitor Well Development

Monitor well development requirements are as follows:

- All newly installed monitor wells will be developed no sooner than 24 hours after installation to allow for grout curing.
- All drilling fluids used during well construction will be removed during development.
- Wells will be developed using surge blocks and bailers or pumps (prior approval for any alternate method will be obtained, in writing, from CCI before well construction begins), and wells will be developed until:
 - the suspended sediment content of the water is less than 0.75 milligrams per liter (ml/L), as measured in an Imhoff cone according to method E160.5; and
 - the turbidity remains within a 10 nephelometric turbidity unit range for at least 30 minutes.

- Discharge water color and volume will be documented.
- No sediment will remain in the bottom of the well.
- No detergents, soaps, acids, bleaches, or other additives will be used to develop a well.

2.1.5 Abandoning Monitor Wells

All abandonment of monitor wells, when directed to do so by the SOW, will be performed in accordance with state and local laws and regulations. If slurry is used, a mud balance and/or Marsh Funnel will be used to ensure that the density (lbs/gal) of the abandonment mud mixture conforms with the manufacturer's specification. All abandoned monitor wells will be checked 24 to 48 hours after mud/solid bentonite emplacement to determine whether curing is occurring properly. More specific curing specifications or quality assurance checks may be recommended by the manufacturer and will be followed. Additionally, if significant settling has occurred, a sufficient amount of mud/solid bentonite will be added to attain its initial level. These slurry/solid bentonite curing checks and any addition of mud/solid bentonite will be recorded in the field logs.

2.1.6 Concrete Materials Sampling Methodologies and Field Testing

Sampling and testing of concrete will be in accordance with required procedures outlined in the project's technical specifications. The technical specifications will typically cross-reference procedures to specific ASTM standards. Testing will be completed by a testing laboratory that is National Institute of Standards and Technology (NIST) certified/ accredited. Laboratory certification will be required prior to concrete placement. Field sampling and testing will be performed by technicians trained in concrete sampling and testing procedures.

If the placement of concrete is required, the following guidelines for sampling and testing will be maintained. Concrete will have a 28-day compressive strength of 3000 pounds per square inch (psi) and will be sampled during placement. Slump will be between 2 and 4 inches in accordance with ASTM C 143. Air content will be tested using ASTM C 33 aggregate Size No. 57 to verify 4 to 6 percent air entrainment for concrete exposed to freeze-thaw conditions. Cylinders will be taken for compressive strength testing and will be broken on days 7 and 28 to verify the concrete is 3000 psi. A copy of the test results for the mix design will be attached to the Daily Production Report for the initial day of use of each concrete supply.

The time of arrival onsite for each load of concrete will be documented. Loads will be placed within 2 hours of arrival onsite. Any load, or portion of a load, onsite in excess of this allowed holding time will be rejected and not used onsite.

Field tests for temperature, slump by cone method, using ASTM C 143, and entrained air by pressure method, using ASTM Method C231, will be completed for each load of concrete delivered to the site prior to placement of the load. Any load of concrete not meeting specified criteria will be rejected for use at the site. Material may be reworked onsite (e.g., additional water, mixing, etc.) to meet specified criteria subject to the limits of the previously identified holding time.

Three concrete cylinders will be collected in accordance with ASTM C 172 for every 40 cubic yards of concrete placed with a minimum of one set of cylinders collected for each day of concrete placement. One cylinder will be tested for 7-day compressive strength and one cylinder will be tested for 28-day compressive strength. The third cylinder will be tested for 28-day compressive strength if the initial 28-day test indicates deficient strength.

2.2 Sampling Design and Quality Assurance Procedures

This section discusses the standard practices and procedures used by CCI and its subcontractors during field operations to ensure the collection of representative samples. Sampling activities conducted by the sampling team are conducted with the expectation that information obtained may be used for enforcement purposes, unless specifically stated to the contrary in advance of the field investigation. Therefore, correct use of proper sampling procedures is essential. Collection of representative samples depends upon: 1) ensuring that the sample is representative of the material being sampled and 2) the use of proper sampling, sample handling, preservation, and quality control techniques.

2.2.1 Definitions

Sample – part of a larger lot, usually an area, a volume, or a period of time.

Representative Sample – a sample that reflects one or more characteristics of a population.

Sample Representativeness – the degree to which a set of samples defines the characteristics of a population, where each sample has an equal probability of yielding the same result.

Variability – the range or “distribution” of results around the mean value obtained from samples within a population. There are three types of variability which must be measured or otherwise accounted for in field sampling.

1. **Temporal Variability** – the range of results due to changes in contaminant concentrations over time. An example would be the range of concentrations obtained for a given parameter in wastewater samples collected at different times from an outfall where contaminant concentrations vary over time.
2. **Spacial Variability** – the range of results due to changes in contaminant concentrations as a function of their location. An example would be the range of concentrations obtained for a given parameter in surface soil from a site where discrete “hot spots” are present due to localized releases of contaminants on otherwise uncontaminated soil.
3. **Sample Handling Variability** – the range of results due to the sample collection and handling by the sampler. This variability manifests itself as a positive bias due to errors such as unclean sampling equipment, cross contamination, etc., or a negative bias due to improper containers or sample preservation.

Accuracy – a measure of agreement between the true value and the measured value of a parameter.

Precision – measure of the agreement among individual measurements of identical samples.

Bias – consistent under or over-estimation of the true value due to sampling errors, sample handling errors, or analytical errors.

Grab Sample – an individual sample collected from a single location at a specific time or period of time. Grab samples are generally authoritative in nature.

Composite Samples – a sample collected over a temporal or spacial range that typically consists of a series of discrete, equal samples (or “aliquots”) which are combined or “composited”. Four types of composite samples are listed below:

1. Time Composite (TC) – a sample comprised of a varying number of discrete samples (aliquots) collected at equal time intervals during the compositing period. The TC sample is typically used to sample wastewater or streams.
2. Flow Proportioned Composite (FPC) – a sample collected proportional to the flow during the compositing period by either a time-varying/constant volume (TVCV) or time-constant/varying volume (TCVV) method. The TVCV method is typically used with automatic samplers that are paced by a flow meter. The TCVV method is a manual method that individually proportions a series of discretely collected aliquots. The FPC is typically used when sampling wastewater.
3. Areal Composite – sample composited from individual, equal aliquots collected on an areal or horizontal cross-sectional basis. Each aliquot is collected in an identical manner. Examples include sediment composites from quarter-point sampling of streams and soil samples from within grids.
4. Vertical Composite – a sample composited from individual, equal aliquots collected from a vertical cross section. Each aliquot is collected in an identical manner. Examples include vertical profiles of soil/sediment columns, lakes, and estuaries.

2.2.2 Sampling Design

Development of a sampling design may follow the seven steps outlined in the EPA publication, Guidance for the Data Quality Objectives Process. The DQO process is a logical step-by-step method of identifying the study objective, defining the appropriate type of data to collect, clarifying the decisions that will be based on the data collected, and considering the potential limitations with alternate sampling designs. Sampling events may be executed without completing the DQO process step-by-step; however, the basic elements of the DQO process will be considered by the project leader for each sampling task.

The sampling design ultimately must meet specific study objectives. The location and frequency of sampling (number of samples) will be clearly outlined in the sampling design, as well as provisions for access to all areas of the site, the use of special sampling equipment, etc. Development of the sampling design in the context of DQOs and sampling optimization are discussed in the ASTM documents Standard Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives, and Standard Guide for the Generation of Environmental Data Related to Waste Management Activities.

2.2.3 Data Quality Objectives

As defined in EPA's Data Quality Objectives Process for Superfund, Interim Final Guidance, DQO are qualitative and quantitative statements derived from the outputs of each step of the

DQO process. The DQO process offers a way to plan field investigations so that the quality of data collected can be evaluated with respect to the data's intended use.

Depending on the study objective and DQOs, different field procedures and analytical methods may be acceptable. Data collected in the field include samples and site information. The methods by which samples are collected may limit the uses of the subsequent analytical data. The methods by which site information, such as physical measurements, photographs, field notes, etc., are collected, may reduce their accuracy. The manner in which sampling equipment is cleaned will also affect the DQO level of the data. Higher quality methods may be substituted for lower level work.

The site-specific addenda to this SAP will detail the data quality objectives for each task to be performed on each site.

There are four data categories. These are defined in the USEPA Region 4 EISOPQAM as follows:

1. Field Screening – This level is characterized by the use of portable instruments which can provide real-time data to assist in the optimization of sampling locations and health and safety support. Data can be generated regarding the presence or absence of certain contaminants at sampling locations.
2. Field Analyses – This level is characterized by the use of portable analytical instruments which can be used onsite, or in a mobile laboratory stationed near a site. Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.
3. Screening Data with Definitive Confirmation – These data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. Sample preparation steps may be restricted to simple procedures such as dilution with a solvent, instead of elaborate extraction/digestion and cleanup. Screening data provides analyte identification and quantification, although the quantification may be relatively imprecise. At least 10 percent of the screening data will be confirmed using appropriate analytical methods and QA/QC procedures and criteria associated with definitive data. Screening data without associated confirmation data is not considered to be data of known quality.
4. Definitive Data – These data are generated using rigorous analytical methods, such as approved EPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. These methods produce tangible raw data (e.g., chromatograms, spectra or digital values) in the form of paper printouts or computer-generated electronic files. Data may be generated at the site or at an offsite location, as long as the QA/QC requirements are satisfied. To be definitive, either the analytical or total measurement error must be determined.

DQO information in the site-specific sampling plans will include:

- Sampling locations – including background and/or control samples
- Sampling procedures – reference to this SOP or other guidance documents
- Sample type – surface water, ground water, soil, waste, GPS coordinates, etc.

- Use of data – characterize nature and extent of contamination, accurate sample locations, etc.
- Data types – field measurements and field analytical data level and laboratory analyses and laboratory analytical data levels
- Field QA/QC – percentage of split and duplicate samples, trip blanks, rinse blanks, etc.

2.2.4 Sampling Methodologies

Samples will be collected in accordance with the USEPA Region 4 EISOPQAM, May, 1996 and updates, and the NFESC Installation Restoration Chemical Data Quality Manual, September 1999 document.

2.2.5 Sample Handling and Mixing

After collection, all sample handling will be minimized. The sampling team will use extreme care to ensure that samples are not contaminated. Shipping containers will be insulated coolers and packed with wet or ice freezer forms. Wet ice substitutes such as dry ice, blue ice, or chemical cooling packs will not be used. The wet ice will be placed in a container such as a trash bag and sealed so that water will not fill the shipping container as the ice melts. Each sample container will be sealed in plastic bags, such as Zip-Lock® bags or similar plastic bags, to prevent cross-contamination and to keep the sample containers dry during shipment. Packing will be provided between containers to avoid breakage.

A chain-of-custody (COC) form, documenting the sample identifications, the number of samples, and the required analyses, will accompany the shipping containers. If shipped by common carrier, the COC form will be placed in a sealed plastic bag taped to the inside of the shipping containers. Shipping containers will be sealed with strapping tape and custody seals to avoid tampering during transport to the laboratory.

2.2.5.1 Sample Mixing

It is extremely important that waste (when appropriate), soil and sediment samples be mixed thoroughly to ensure that the sample is as representative as possible of the sample media. The most common method of mixing is referred to as quartering. The quartering procedure will be performed as follows:

1. The material in the sample pan will be divided into quarters and each quarter will be mixed individually.
2. Two quarters will then be mixed to form halves.
3. The two halves will be mixed to form a homogenous matrix.

This procedure will be repeated several times until the sample is adequately mixed. If round bowls are used for sample mixing, adequate mixing is achieved by stirring the material in a circular fashion, reversing direction, and occasionally turning the material over.

2.2.5.2 Special Handling of Samples for Volatile Organic Compounds Analysis

Water samples to be analyzed for volatile organic compounds (VOCs) will be stored in 40-millimeter (ml) septum vials with screw cap and Teflon®-silicone disk in the cap to

prevent contamination of the sample by the cap. The disks will be placed in the caps (Teflon® side to be in contact with the sample) in the laboratory prior to the beginning of the sampling program.

The vials will be completely filled to prevent volatilization, and extreme caution will be exercised when filling a vial to avoid any turbulence which could also produce volatilization. The sample will be carefully poured down the side of the vial to minimize turbulence. As a rule, it is best to gently pour the last few drops into the vial so that surface tension holds the water in a convex meniscus. The cap is then applied and some overflow is lost, but the air space in the bottle is eliminated. After capping, turn the bottle over and tap it to check for bubbles. If any bubbles are present, repeat the procedure with another clean 40-ml vial. Since the VOC vials are pre-preserved, caution will be exercised when the vials are used as the collection device for surface water samples in order to prevent the loss of the preservative. When collecting water samples for VOCs, a minimum of two 40-ml vials containing preservative will be filled with the sample.

Unless otherwise specified by the SAP Addendum, two 5-gram and one 25-gram Encore samplers will be used to collect each soil or sediment sample for VOC analyses. Soil and sediment samples collected for VOC analyses will **not** be mixed. The samples must be shipped as soon as possible to the laboratory as there is currently a 48 hour holding time from the time of sampling to sample preparation by the laboratory.

2.2.5.3 Sample Preservation and Holding Times

When samples are collected for offsite analyses, they will be sent to the laboratory within 24 hours after collection to ensure that the most reliable and accurate answers will be obtained as a result of the analysis. The holding time begins from the date and time of collection in the field.

All environmental samples, as well as QA/QC samples, will be preserved to a temperature of 4 ± 2 degrees Celsius ($^{\circ}\text{C}$) prior to shipment to the analytical laboratory, using ice or refrigeration. This temperature should be maintained during shipment by placing ice in leak-proof containers, and placing it above and below the sample containers. Other sample preservation requirements and holding times applicable to the sample matrix and analyses will be detailed in the site-specific addenda.

2.3 Equipment Decontamination

2.3.1 Large Field Equipment Decontamination

All equipment that may directly or indirectly contact samples will be decontaminated in a designated decontamination area. This includes casing, drill bits, auger flights, the portions of drill rigs that stand above boreholes, sampling devices, and instruments, such as slugs and sounders. In addition, the subcontractor will take care to prevent the sample from coming into contact with potentially contaminating substances, such as tape, oil, engine exhaust, corroded surfaces, and dirt.

If the State does not have its own requirements, the following procedure will be used to decontaminate large pieces of equipment, such as casings, auger flights, pipe and rods, and those portions of the drill rig that may stand directly over a boring or well location or that

come into contact with casing, auger flights, pipe, or rods. The external surfaces of equipment will be washed with high-pressure hot water and Alconox, or equivalent laboratory-grade detergent, and if necessary, scrubbed until all visible dirt, grime, grease, oil, loose paint, rust flakes, etc., have been removed. The equipment will then be rinsed with potable water. The inside surfaces of casing, drill rod, and auger flights will also be washed as described.

The following procedure will be used to decontaminate sampling and drilling devices, such as split spoons, bailers, and augers that can be hand-manipulated. For sampling and smaller drilling devices, scrub the equipment with a solution of potable water and Alconox, or equivalent laboratory-grade detergent. Then rinse the equipment with copious quantities of potable water followed by analyte-free. (If equipment has come in contact with oil or grease, rinse the equipment with pesticide-grade methanol followed by with pesticide-grade hexane.) Air dry the equipment on a clean surface or rack, such as Teflon[®], stainless steel, or oil-free aluminum elevated at least two feet above ground. If the sampling device will not be used immediately after being decontaminated, it will be wrapped in oil-free aluminum foil, or placed it in a closed stainless steel, glass, or Teflon[®] container.

Decontamination of field equipment is necessary to support the quality of samples by preventing cross contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants offsite. All reusable equipment (non-dedicated) used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample. Decontamination of equipment will occur at the sampling location(s). The sample location will include a bucket in which sampling equipment can be cleaned. Decontamination water will be transferred into 55-gallon drums or a frac tank for storage.

All items that contact contaminated media will be decontaminated before use and between sample locations if dedicated sampling equipment is not used. If decontaminated items are not immediately used, they will be covered either with plastic or aluminum foil depending on the size of the item. Field equipment decontamination will be performed IAW procedures described in the USEPA Region 4 EISOPQAM.

2.3.2 Cross-Contamination Minimization

Cross-contamination is the introduction of contaminants into the sample through the sampling and/or sample-handling procedures. It can cause an otherwise representative sample to become non-representative. The most important means of minimizing cross-contamination are as follows:

Sampling expendables, i.e., sample gloves, pipettes, string, dip jars, etc., must not be reused. Used expendables should be labeled so they are not confused with non-contaminated trash

Minimum contact should be made between the sampler and the sample medium. For example, a sampler should not walk across a contaminated area and then take a surface soil sample where [he/she] has just stepped.

Sample collection activities should proceed progressively from the least contaminated area to the most contaminated area

Sampling equipment should be constructed of Teflon®, stainless steel, or glass that been properly pre-cleaned for collecting samples. Equipment constructed of plastic or PVC should not be used to collect samples for trace organic analyses.

Any tools used in sampling must be carefully decontaminated prior to first use and after each sample.

Activities that could contaminate samples are prohibited in the sample handling and preparation area. These activities and the possible contaminants include:

- Smoking – PAHs
- Spraying for insects – pesticides, oils, solvents
- Spraying for weeds – herbicides, oils, solvents
- Refueling – BTEX, hydrocarbons
- Painting and paint stripping – solvents

2.4 Field Quality Control

Quality control samples are collected during field studies for various purposes which include the isolation of site effects (control samples), define background conditions (background sample), evaluate field/laboratory variability (spikes and blanks, trip blanks, duplicate, split samples). Definitions for specific quality control samples are listed below.

Control Sample – typically a discrete grab sample collected to isolate a source of contamination. Isolation of a source could require the collection of both an upstream sample at a location where the medium being studied is unaffected by the site being studied, as well as a downstream control which could be affected by contaminants contributed from the site under study.

Background Sample – a sample (usually a grab sample) collected from an area, water body, or site similar to the one being studied, but located in an area known or thought to be free from pollutants of concern.

Split Sample – a sample which has been portioned into two or more containers from a single sample container or sample mixing container. The primary purpose of a split sample is to measure sample handling variability.

Duplicate Sample – two or more samples collected from a common source. The purpose of a duplicate sample is to estimate the variability of a given characteristic or contaminant associated with a population.

Trip Blanks – a sample which is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and submitted for analysis. At no time after their preparation are trip blanks to be opened before they reach the laboratory. Trip blanks are used to determine if samples were contaminated during storage and/or transportation back to the laboratory (a measure of sample handling variability resulting in positive bias in contaminant concentration). If samples are to be shipped, trip blanks are to be provided with each cooler.

Spikes – a sample with known concentrations of contaminants. Spike samples are often packaged for shipment with other samples and sent for analysis. At no time after their preparation are the sample containers to be opened before they reach the laboratory. Spiked samples are normally sent with each shipment to contract laboratories only. Spiked samples are used to measure negative bias due to sample handling or analytical procedures, or to assess the performance of a laboratory.

Pre-Cleaned Equipment Blanks – a sample collected using analyte-free water which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Pre-cleaned equipment blanks will be collected on equipment that is brought to the site pre-cleaned and ready for use. Pre-cleaned equipment will include disposable sampling equipment (i.e., disposable Teflon bailers, etc.). These blanks will be collected from the sampling equipment immediately prior to sampling by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers.

Field-Cleaned Equipment Blanks – a sample collected using organic-free water which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Field-cleaned equipment blanks are often associated with collecting rinse blanks of equipment that has been field-cleaned. These blanks will be collected after the equipment is decontaminated by rinsing the sampling equipment with analyte-free water and collecting rinsate in the appropriate sample containers.

Field Blanks – a sample that is prepared in the field to evaluate the potential for contamination of a sample by site contaminants from a source not associated with the sample collected (for example air-borne dust or organic vapors which could contaminate a soil sample). Organic-free water is taken to the field in sealed containers or generated onsite. The water is poured into the appropriate sample containers at pre-designated locations at the site. Field blanks will be collected in dusty environments and/or from areas where volatile organic contamination is present in the atmosphere and originating from a source other than the source being sampled.

Material Blanks – samples of sampling materials (e.g., material used to collect wipe samples, etc.), construction materials (e.g., well construction materials), or reagents (e.g., organic/analyte free water generated in the field, water from local water supplies used to mix well grout, etc.) collected to measure any positive bias from sample handling variability. Commonly collected material blanks are listed below:

Wipe Sample Blanks – a sample of the material used for collecting wipe samples. The material is handled, packaged, and transported in the same manner as all other wipe samples with the exception that it is not exposed to actual contact with the sample medium.

Grout Blanks – a sample of the material used to make seals around the annular space in monitoring wells.

Filter Pack Blanks – a sample of the material used to create an interface around the screened interval of a monitoring well.

Construction Water Blanks – a sample of the water used to mix or hydrate construction materials such as monitoring well grout.

Organic/Analyte Free Water Blanks – a sample collected from a field organic/analyte free water generating system. The sample is normally collected at the end of sampling activities since the organic/analyte free water system is recharged prior to use on a study. On large studies, samples can be collected at intervals at the discretion of the project leader. The purpose of the organic/analyte free water blank is to measure positive bias from sample handling variability due to possible localized contamination of the organic/analyte free water generating system or contamination introduced to the sample containers during storage at the site. Organic/analyte free water blanks differ from field blanks in that the sample will be collected in as clean an area as possible (a usual location for the organic/analyte free water system) so that only the water generating system/containers are measured.

QC samples will be collected and analyzed for the identical parameters, using the same method, as the samples collected during the same sampling event. All QC samples will be collected, handled, and documented in the same manner as samples collected during the sampling event.

QC samples for the site-specific projects will be provided in a tabular format in the work plan addenda.

2.5 Field Documentation

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

2.5.1 Sample Identification

All samples and field quality control will be designated a unique sample identification. The sample identification procedure will be implemented for the following types of environmental samples collected:

- Waste Characterization Samples and Incidental Wastestream Samples
 - CTO Number-Location-Environmental Media-Month and Date-Year
 - Environmental Media: S (Soil), SL (Sludge), SW (Surface Water), GW (Groundwater), WW (Wastewater), and A (Air)
 - Month and Date: Four digit number representing the month and date (e.g., 0402 is April 2)
 - Year: Last two digits of the calendar year (e.g., 98 is the calendar year 1998)
 - Confirmation Samples: CTO Number-Location-Environmental Media-Month and Date-Year
- Monitoring Well Samples

- CTO Number-Monitoring Well Location-Q #-Year-Number of Months of Treatment System Operation (if applicable)
- Q #: Represents the quarter number in the calendar year (e.g., fourth quarter is Q4)
- Number of Months of Treatment System Operation (if applicable): Represents the number of months the groundwater treatment system, soil treatment system, and/or product recovery system has been in operation since start-up.

An example of the monitoring well sample identification protocol is a quarterly sampling event conducted at a site with an air sparge system that has been in operation since November 1997. The sample event, conducted under CTO No. 0002, included a sample collected from groundwater monitoring well MW-1 in May 1998. This example has the following identification number: 002-MW1-Q2-98-06.

- CTO Number-Equipment Location-Influent or Effluent-Media-Month and Date-Year-Number of Months of Treatment System Operation (if applicable)
- Equipment Location: Air Stripper (ASl), Activated Carbon Adsorption Units (ACA), Oil/Water Separator (OWS), Soil Vapor Extraction Blower (SVE), Monitoring Well (MW), and Recovery Trench (RT). This list may be modified based onsite-specific project locations. If required, the work plan addenda will document the site-specific treatment system sample locations.
- Influent or Effluent: Influent to the specific equipment or treatment system location where the sample is collected will be designated by the letter I. Effluent from the specific equipment or treatment system location where the sample is collected will be designated by the letter E.

An example of the treatment system sample identification protocol is an air quality sample collected under CTO No. 0002 from the soil vapor extraction blower effluent on June 2, 1998. The air sparge and soil vapor extraction system has been in operation since November 1997. This example would have the following identification number: 002-SVE-E-A-0602-98-07.

2.5.2 Sample Custody

Because of the evidentiary nature of samples collected throughout the project, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. To maintain and document sample possession, COC procedures are followed as described below:

A sample is under your custody if:

- It is in your actual possession, or
- It is in your view, after being in your physical possession, or
- It was in your physical possession and then you locked it up to prevent tampering, or
- It is in a designated secure area.

The custody of samples is recorded in the following field documents:

- Sample logs
- Sample labels

- Custody seals, and
- COC form

2.5.3 Sample Logbook

It is necessary for the sampling crew to maintain daily field notes. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

Repetition of information recorded in other permanent logs should be avoided, but enough should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific event or a procedure used, it will be answered from these notes. The following information should be logged into the logbooks and/or database:

Sample number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, COC and airbill numbers, preservatives, and date samples were sent

- Name of laboratories and contacts to which the samples were sent, turnaround time (TAT) requested, and data results, when possible
- Termination of a sample point or parameter and reasons
- Unusual appearance or odor of a sample
- Measurements, volume of flow, temperature, and weather conditions
- Additional samples and reasons for obtaining them
- Levels of protection used (with justification)
- Meetings and telephone conversations held with the Southern Division, NTR, regulatory agencies, project manager, or supervisor
- Details concerning any samples split with another party
- Details of QC samples obtained
- Sample collection equipment and containers, including their serial or lot numbers
Details of QC samples obtained
- Field analytical equipment, and equipment utilized to make physical measurements will be identified
- Calculations, results, and calibration data for field sampling, field analytical, and field physical measurement equipment
- Property numbers of any sampling equipment used, if available
- Sampling station identification

- Date and time of sample collection
- Description of the sample location
- Description of the sample
- Who collected the sample
- How the sample was collected
- Diagrams of processes
- Maps/sketches of sampling locations
- Weather conditions that may affect the sample (e.g., rain, extreme heat or cold, wind, etc.)

These notes must be dated and signed (each page) for validity in a court of law. All logbooks will be bound and pre-numbered. All logbook entries will be made with indelible ink and legibly written. The language will be factual and objective. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark, initialed, and dated.

When audits are performed, the auditor's remarks and decisions must also appear in these notes. These audits should be followed up by written report submitted by the auditor, including opinions and conclusions. A copy of this report should be placed in the project file and one copy kept in the sampling file for easy reference.

2.5.4 Sample Labels

Any samples placed into a sample container will be identified by a sample label. Included on the label are the following information:

- Project Number and Project Name
- Date – Month, day, year
- Time – Military time
- Sample Identification
- Sample Description
- Sampler – Sampler's name(s)
- Preservatives
- Analyses Requested

The information described above should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample logbook.

2.5.5 Custody Seals

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample jars. They should be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample bottle or across the openings of the sample transport containers.

2.5.6 Chain-of-Custody Form

A COC form will be completed for each sampling event and will accompany the samples during shipment. The COC record documents the sample information and the transfer of custody from the sampler to the laboratory. The record will, at a minimum, contain the following:

- Project Name
- Project Location – city and state in which the project is located
- Project Number
- Project Contact – CCI employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results given (Project Manager, Site Supervisor, Project QC Officer, or Project Chemist)
- Site Telephone Number – telephone number of onsite office trailer or number where person responsible for samples can be contacted.
- Sample Date – month, day, year
- Sample Time – military time
- Sample Identification – unique sample number/identifier
- Sample Type – designation of sample as grab or composite
- Sample Description – sample matrix and a brief description of the sampling location
- Sample Preservation – preservatives used
- Analytical Parameters Requested – analytical parameter, method numbers, and specific compounds of interest, if applicable
- Airbill or courier tracking number
- Laboratory – laboratory where samples are to be sent
- Laboratory Phone – telephone number of laboratory
- Laboratory Contact – contact for laboratory
- Laboratory Purchase Order Number
- Relinquished By – signature of sender (CCI)
- Date Relinquished – date samples were relinquished
- Accepted By – signature of acceptor
- Date Received – date samples were accepted
- Turnaround Time – TAT requested or date the results are required from the lab
- Sampler's Signature – signature of sampler

- Signature of person(s) involved in chain of possession
- Transfer date(s) and time(s) in chain of possession

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

If the samples are shipped by common carrier, the COC form will be placed in a sealed plastic bag inside the shipping container. Prior to shipment, the shipping container will be secured with strapping tape and a custody seal. Thus, in the case of using a common carrier for shipment, two signatures will be required on the final COC: one signature by the sample technician who prepared the form and one signature of the sample custodian assigned by the laboratory. The sample technician will relinquish the samples to the carrier. The carrier's company name and tracking number will be placed in the box of "receiver" and in the box of "relinquisher" upon being received at the laboratory by the sample custodian. The sample custodian must ensure that the tracking number on the sample container matches that on the COC. The sample custodian assigned by the laboratory will open the shipping container and will document on the COC form any shipping container custody seal breaks and/or shipping container or sample container(s) damage.

2.6 Waste Handling

2.6.1 General Waste Handling Procedures

Waste handling will be dealt with on a site-by-site basis. Waste may be classified as noninvestigative waste or investigative/field-generated waste.

Noninvestigative waste, such as litter and household garbage, will be collected on an as-needed basis to maintain each site in a clean and orderly manner. This waste will be containerized and transported to the designated sanitary landfill or collection bin. Acceptable containers will be sealed containers or plastic garbage bags. Garbage bags will be disposed of daily.

Investigative/field-generated waste will be properly containerized and temporarily stored at each site, prior to transportation. Depending on the constituents of concern, fencing or other special marking may be required. The number of containers will be estimated on an as-needed basis. Acceptable containers will be sealed, U.S. Department of Transportation (DOT)-approved steel 55-gallon drums or small dumping bins with lids. The containers will be transported in such a manner to prevent spillage or particulate loss to the atmosphere. To facilitate handling, the containers will be no more than half full when moved.

The investigative/field-generated waste will be segregated at the site according to matrix (solid or liquid) and as to how it was derived (drill cuttings, drilling fluid, decontamination fluids, and purged groundwater). Each container will be properly labeled with site identification, sampling point, depth, matrix, constituents of concern, and other pertinent information for handling.

2.6.2 Management of Hazardous IDW

Disposal of hazardous or suspected hazardous investigation derived waste (IDW)/field-generated waste must be specified in the approved study plan. Hazardous IDW must be

disposed as specified in USEPA regulations. If appropriate, these wastes may be placed back in an active facility waste treatment system. These wastes may also be disposed of in the source area from which they originated, if doing so does not endanger human health and the environment. Drums containing IDW will be stored at Building 1694 for 90 days or less. They will be properly labeled for transport as described in Section 3.4.2.

If onsite disposal is not feasible, and if the wastes are suspected to be hazardous, appropriate tests must be conducted to make that determination. If they are determined to be hazardous wastes, they must be properly contained and labeled. They may be stored on the site for a maximum of 90 days before they must be manifested and shipped to a permitted treatment or disposal facility. Generation of hazardous IDW/field-generated waste must be anticipated, if possible, to permit arrangements for proper containerization, labeling, transportation, and disposal/treatment in accordance with USEPA regulations.

The generation of hazardous IDW/field-generated waste will be minimized to conserve project resources. Most routine studies will not produce any hazardous IDW/field-generated waste, with the exception of spent solvents and possibly purged ground water. Care will be taken to keep non-hazardous materials segregated from hazardous waste contaminated materials. The volume of spent solvents produced during equipment decontamination will be controlled by applying only the minimum amount of solvent necessary, and capturing it separately from the washwater.

2.7 Analytical Methods

Analytical testing will be completed in accordance with the site-specific requirements provided in the project specifications. Analytical methods and sample collection frequency for confirmation samples, treatment system samples, waste characterization samples, incidental wastestream samples and well samples will be provided in the site-specific work plan addenda. The addenda will provide, in tabular format, the required sample collection locations, frequency, and analytical methods.

All samples will be analyzed, whenever possible, according to the most current methods in the USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Alternative methods of analysis from other sources (Contract Laboratory Program [CLP], ASTM, National Institute of Occupational Safety and Health [NIOSH], Standard Methods, etc.) may also be used.

2.7.1 Laboratory Qualification Requirements

The laboratory(ies) to be used for this project must be approved/audited by the Navy, Air Force Center for Environmental excellence (AFCEE), or United States Army Corps of Engineers (USACE)-Missouri River District (MRD) throughout the course of the project. Variance from these requirements must be approved in writing by CCI and the Navy prior to any analytical work.

The laboratory's data validation and quality analysis procedures will conform to USEPA SW-846 methods and the USEPA National Functional Guidelines. These stringent requirements provide written procedures for laboratory methodologies, equipment, and quality analyses. Each certified laboratory is inspected on an annual basis to verify laboratory operations are being conducted in conformance with certification requirements.

2.7.2 Laboratory Management of Samples

The laboratory will assign a sample custodian to receive samples. The sample custodian will open the shipping container(s) and denote any damage to the shipping container or sample containers on the COC form for the samples. Upon receipt of a sample, the custodian will inspect the condition of each sample, check the preservation (pH, except for volatiles), check for headspace in water samples for volatiles analyses, and document any discrepancies between information presented on the sample label and the COC record. The custodian will assign a unique laboratory number to each sample, record the sample in the laboratory logbook, and store the sample in a secured storage room or cabinet until assigned to an analyst for analysis. Each sample will be stored in the appropriate conditions, such as $4 \pm 2^{\circ}\text{C}$, if required, and for maximum holding times identified by 40 Code of Federal Regulations (CFR) 136, USEPA "Guidelines Establishing Test Procedures for the Analysis of Pollutants."

The custodian will immediately contact the CCI project contact in the event any shipping container seal is broken, temperature limits are exceeded, headspace is detected in water samples for volatile analyses, any discrepancies between the COC and sample labels are noted, or any sample container is damaged. Any problem(s) documented by the sample custodian will be resolved with the CCI project contact, in writing, before the sample is assigned for analysis.

2.7.3 Data Acquisition

2.7.3.1 Analytical Method Requirements

Analytical requirements for this each site will be discussed in the work plan addenda.

2.7.3.2 Quality Control Requirements

Site-specific QC requirements for precision, accuracy, completeness, and quantitation limits will be discussed in the addenda. QC procedures and acceptance limits must be met as specified in the individual methods. In addition, the laboratory must meet the specification and requirements as described in the NFESC Installation Restoration Chemical Data Quality Manual, September 1999 document.

2.7.3.3 Instrument Testing, Inspection, and Maintenance

Proper maintenance is critical to the performance of minimization of downtime of all equipment, whether it be for measurement or support. Inspection will be performed, at a minimum, prior to use of the instruments. Preventive maintenance will be performed as recommended by the manufacturer of the respective equipment. All routine maintenance and major repairs performed on field screening or analytical equipment will be recorded in bound maintenance logbooks that have been specifically designated for that instrument. Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent use, or will be tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated or completely replaced.

2.7.3.4 Data Deliverable Package Requirements

Table 2-1 describes the three CCI levels of data deliverable requirements. The site-specific addenda will identify the CCI data package level required for each sampling activity, as required by the data quality objectives for each activity.

2.7.4 Data Management

Data management is the system by which data is reduced, reviewed, validated, reported, distributed, and finally archived. The criteria in this system are designed to meet the project objectives.

2.7.4.1 Laboratory Data Reduction

Data reduction includes the identifications and calculations necessary to convert the raw instrument readings to the final reported compounds and their respective concentrations.

Each analyst is responsible for converting raw data into reportable values. These specific duties include:

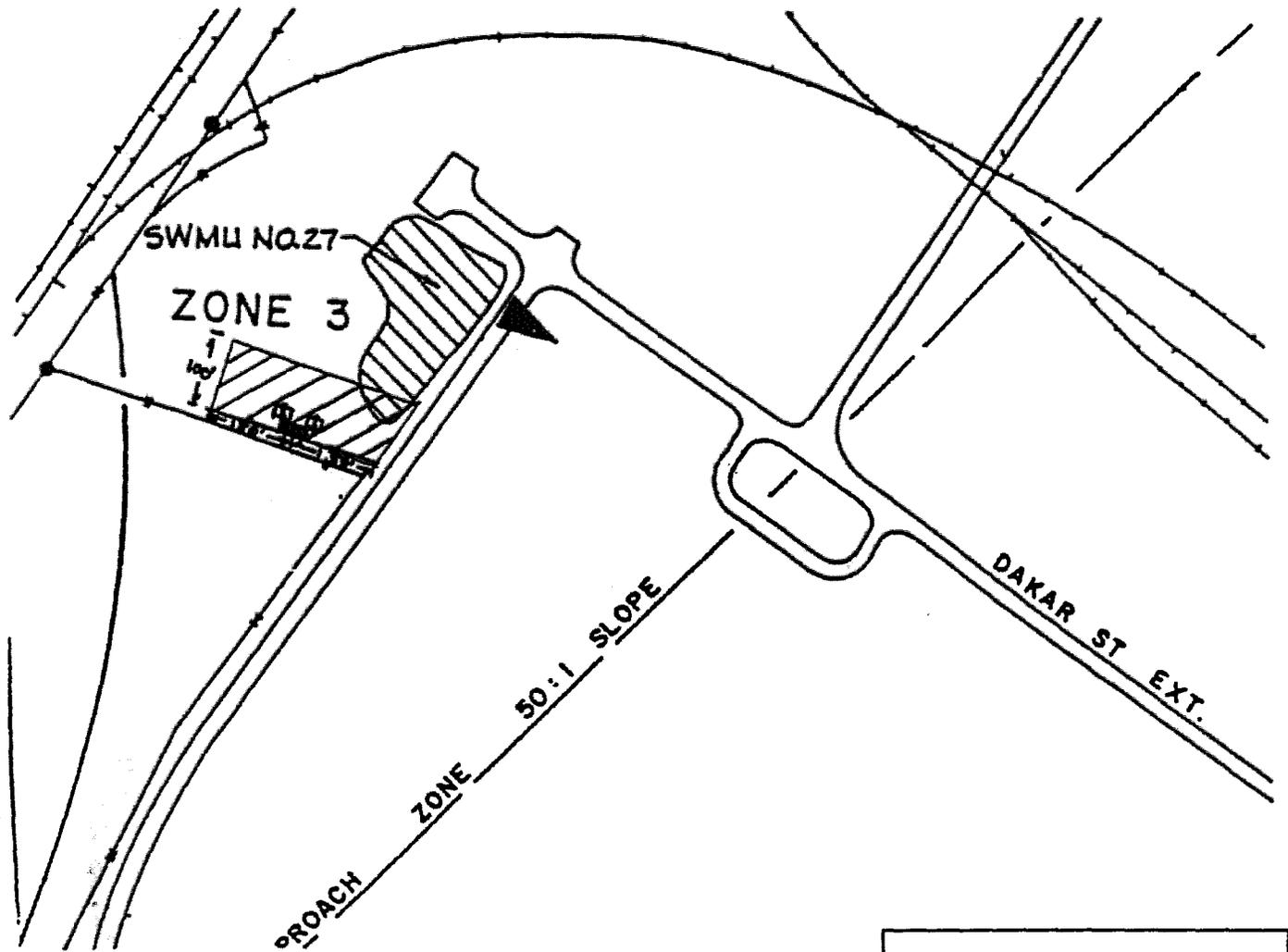
- Proper identification of the analyte
- Generation of calculations
- Checking all calibrations to ensure:
 - All QA/QC checks are supportive of data
 - All documentation is complete and accurate in respective logbooks
 - All chromatograms and strip chart recordings are labeled with data, instrument number, run parameters and analyst

2.7.4.2 Laboratory Data Validation

All data generated within the laboratory will be extensively checked for accuracy and completeness. The data validation process consists of data generation, reduction, and three levels of review.

The analyst who generates the raw data has the prime responsibility for the correctness and completeness of the data. All data generated and reduced follows protocols specified in the laboratory SOPs. Each analyst reviews the quality of his work based on an established set of guidelines. The guidelines are:

- Sample preparation information is correct and complete.
- Analysis information is correct and complete.
- Appropriate SOPs have been followed.
- Analytical results are correct and complete.
- QC samples are within established control limits.
- Blanks are within appropriate QC limits.
- Special sample preparation and analytical have been met.
- Documentation is complete.



LEGEND

-  PROPOSED SAMPLE LOCATION
-  DRUM FIND LOCATION
-  LIMITS OF INVESTIGATION

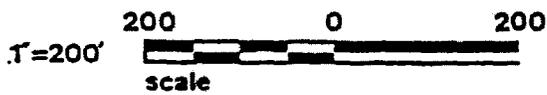
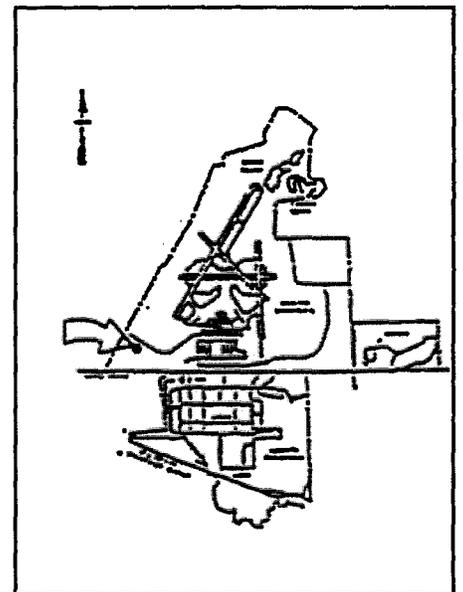


Figure 2-1
 Decon Area Location Map
 NSA Mid-South
 Millington, Tennessee

TABLE 2-1
Data Deliverable Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	CCI Level A	CCI Level B	CCI Level C	
Organics by GC or HPLC	Case Narrative (See Note 1)		X	X	X	
	Corrective Action Report		X	X	X	
	Cross-reference of CCI Sample Numbers, Lab IDs, and analytical QC batches	IV	X	X	X	
	COC Form, Cooler Receipt form		X	X	X	
	Data Summary for each blank and sample (See Note 2)	I	X	X	X	
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits) Note: The LCS will be spiked with all analytes of interest.		X	X	X	
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X	X	X	
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits) Note: MS/MSD must be performed on each batch of 20 Navy samples. Matrix spike QC must contain all the targeted analytes of interest at a concentration not less than 10 times the MDL. When using analytical methods for determination of classes of compounds (e.g. fuels analysis for total petroleum hydrocarbons (TPH)-gasoline or TPH-diesel), the matrix spike must contain each targeted class of compounds.	III	X	X	X	
	Initial Calibration Data for each column (indicate which column was used for quantitation) Note: All analytes must meet calibration acceptance criteria prior to analysis of samples.	VI			X	X
	Second Source Verification (including acceptance limits) Note: Acceptance criteria must be at least as stringent as the criteria applied to calibration checks.				X	X
	Second Source Verification (including acceptance limits) Note: Acceptance criteria must be at least as stringent as the criteria applied to calibration checks.				X	X
	Continuing Calibration Data (indicate which column was used for quantitation) Note: All analytes must meet calibration acceptance criteria prior to analysis of samples	VII			X	X
	Chromatograms for each sample (and reruns), confirmation runs, blank, spike, duplicate, and standards					X
	Raw Quantitation Report (area vs. retention time)					X
	Copies of Sample Preparation Bench Sheets					X
	Copies of Standard Preparation Logs					X

TABLE 2-1
Data Deliverable Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	CCI Level A	CCI Level B	CCI Level C
	Copies of Run Logs	VIII			X
Organics by GC/MS	Case Narrative (See Note 1)		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of CCI sample numbers, Lab IDs, and analytical QC batches	IV		X	X
	COC Form, Cooler Receipt Form		X	X	X
	Data Summary for each blank and sample (See Note 2)	I	X	X	X
	Tentatively Identified Compounds (TICs) for each sample (ten peaks)	I, TIC		X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits) Note: The LCS will be spiked with all analytes of interest.		X	X	X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits) Note: MS/MSD must be performed on each batch of 20 Navy samples. Matrix spike QC must contain all the targeted analytes of interest at a concentration not less than 10 times the MDL.	III	X	X	X
	Instrument Performance Check (Tuning) Report	V		X	X
	Initial Calibration Data (including acceptance limits)	VI		X	X
	Second Source Verification (including acceptance limits) Note: Acceptance criteria must be at least as stringent as the criteria applied to calibration checks.			X	X
	Continuing Calibration Data (including acceptance limits) Note: All analytes must meet calibration acceptance criteria prior to analysis of samples. The GC/MS calibration check solutions must include all targeted analytes, including all non-CCC and non-SPCC compounds.	VII		X	X
	Internal Standard Areas and Retention Times Reports (including acceptance limits and out-of-control flags)	VIII		X	X
	Reconstructed Ion Chromatogram for each sample and rerun, blank, spike, duplicate, and standard				X
	Raw Quantitation Report				X
	Raw and background subtracted mass spectra for each target analyte found				X
	Mass spectra of TICs with library spectra of 5 best-fit matches				X
	Copies of Sample Preparation Bench Sheets				X
	Copies of Standard Preparation Logs				X

TABLE 2-1
Data Deliverable Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	CCI Level A	CCI Level B	CCI Level C	
	Copies of Run Logs				X	
Metals	Case Narrative (See Note 1)		X	X	X	
	Corrective Action Report		X	X	X	
	Cross-reference of CCI Sample Numbers, Lab IDs, and analytical QC batches		X	X	X	
	COC Form, Cooler Receipt form		X	X	X	
	Data Summary for Each Sample (See Note 2)	I-IN	X	X	X	
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits) Note: The LCS will be spiked with all analytes of interest.	VII-IN	X	X	X	
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits) Note: MS/MSD must be performed on each batch of 20 Navy samples. Matrix spike QC must contain all the targeted analytes of interest at a concentration not less than 10 times the MDL.	V (PART 1)IN	X	X	X	
	Post-digestion Spike Recovery for ICP	V (PART 2)IN	X	X	X	
	Duplicate Sample Report		X	X	X	
	Blank Results	III-IN	X	X	X	
	Initial Calibration Data	III-IN		X	X	
	Second Source Verification (including acceptance limits) Note: Acceptance criteria must be at least as stringent as the criteria applied to calibration checks.				X	X
	Continuing Calibration Data Note: All analytes must meet calibration acceptance criteria prior to analysis of samples.	II (PART I)-IN			X	X
	ICP Interference Check Sample Report	II (PART I)-IN			X	X
	Standard Addition Results	IV-IN			X	X
	ICP Serial Dilution Results	VIII-IN				X
	Instrument or Method Detection Limit Summary					X
	Linear Range Summary					X
	Copies of Preparation Logs	IX-IN				X
	Copies of Analysis Run Logs	XIII-IN				X
	Copies of Standard Preparation Logs	XIV-IN				X
	Raw Data and Instrument Printouts					X

TABLE 2-1
Data Deliverable Package Requirements

Method	Deliverable Requirement	Equivalent EPA Form	CCI Level A	CCI Level B	CCI Level C
Inorganic	Case Narrative (See Note 1)		X	X	X
Chemistry	Corrective Action Report		X	X	X
(Note 3)	Cross-reference of CCI sample numbers, Lab IDs, and analytical QC batches		X	X	X
	COC Form, Cooler Receipt form		X	X	X
	Data Summary for each blank and sample (See Note 2)		X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits) Note: The LCS will be spiked with all analytes of interest		X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits) Note: MS/MSD must be performed on each batch of 20 Navy samples. Matrix spike QC must contain all the targeted analytes of interest at a concentration not less than 10 times the MDL.		X	X	X
	Duplicate Sample Report		X	X	X
	Calibration Reports Initial and Continuing Note: All analytes must meet calibration acceptance criteria prior to analysis of samples				X
	Second Source Verification (including acceptance limits) Note: Acceptance criteria must be at least as stringent as the criteria applied to calibration checks.				X
	Copies of Sample Preparation logs				X
	Raw Data and Instrument Printouts				X

Notes:

Case narrative must include: Project summary referencing the analytical methodology, discussion of any protocol/procedure deviations, discussion of QC issues encountered during analysis and corrective actions taken, summary and discussion of samples that were diluted because of the presence of an interference, non-target analyte, or target analyte, and discussion of QC samples exceeding established control limits and corrective actions taken.

Must include: Sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date.

Deliverables depend on method's QC.

The next level of review is performed by the section supervisor or data review specialist. The review is structured to ensure that:

- Calibration data are scientifically sound, appropriate to method, and completely documented
- QC samples are within established limits
- Reporting units are consistent with the method and the matrix
- Quantitative results are correct
- Data results are consistent with information on the COC
- Documentation is complete
- The data is ready for incorporation into a final report
- The data package is complete and ready for data archive

The second level of review is structured to ensure all calibration data and QC sample results are reviewed and all of the analytical results from 10 percent of the samples are checked back to the bench sheet. If no problems are found with the data package, the review is complete. If problems exist, an additional 10 percent is reviewed, the process continues until no errors are found or the package has been reviewed in its entirety.

The final level of review by the laboratory comes from the program administrator or laboratory QA Officer. He/she reviews the report to ensure that the data meets the overall objectives of the project.

Once the data has been validated, it is ready for report production. The report will contain:

- Description of sample types
- Tests performed, problems encountered during testing
- Dates sampled
- Date received
- Date extracted
- Date analyzed
- Analytical results
- Reportable limits
- QC information: percent recovery, relative percent difference, control limits, blanks analyses, matrix spikes, and other additional special QC information
- Qualifiers for data falling outside of QC limits
- Methodology
- Name of the analyst

- Signature of laboratory representative
- Dual column confirmation results
- Calibrations (when requested)
- Instrument performance checks (when requested)

The report from the laboratory will also include a copy of the original COC form for the samples analyzed.

2.7.4.3 Project Data Review/Evaluation/Data Validation

CCI has three levels of review through which data can be processed. These are data review, data evaluation, and data validation. The level of review depends on the data quality objectives for each sampling activity. For example, for screening data or preliminary data faxed to the site by the laboratory, a data review can be performed. Data used to characterize waste or delineate areas of contamination (followed with confirmation sampling), would undergo data evaluation. Data used for confirming excavation cleanups would undergo data validation. A discussion of each of the levels is included in the following sections.

Data Review

The project chemist or Project QC Manager, whichever is available, is responsible for review and/or evaluation of the data from the laboratory. This review includes:

- Verifying that all requested data are reported
- Verifying that samples are analyzed according to the contract specified method
- Verifying that holding times are not exceeded
- Verifying that matrix spike (MS), matrix spike duplicate (MSD), lab control samples (LCS), duplicate, and surrogate recoveries fall within the laboratory's acceptable criteria
- Reviewing blank data for gross contamination
- Reviewing field quality control results for gross inconsistencies

The project chemist or Project QC Manager is then responsible for informing the Project Manager and Program QA/QC Manager of any laboratory and/or sampling deficiencies or issues. These issues and subsequent decisions will be documented on a weekly report to the Program QA/QC Manager and Project Manager.

Data Evaluation

The project chemist or QA/QC manager, whichever is available, is responsible for evaluation of the data from the laboratory. This evaluation includes:

- Verifying that all requested data are reported
- Verifying that samples are analyzed according to the contract specified method
- Verifying that holding times are not exceeded

- Verifying that MS, MSD, LCS, duplicate, calibrations, internal standards, instrument performance checks, second source verification, and surrogate recoveries fall within the method's and laboratory's historical limits
- Reviewing method, trip, equipment rinsate, and field blanks data for gross contamination
- Reviewing field quality control results for gross inconsistencies

A report will be generated to summarize the findings of the evaluation.

Data Validation

Data validation is an extensive review of the data for technical and legal validity. This procedure may be performed by an independent third-party subcontractor or by CCI, if the data quality objectives deem it to be necessary. The guidelines to be used for data validation will be the USEPA National Functional Guidelines for Data Validation of Organics and Inorganics.

2.7.4.4 Data Assessment Procedures

Reliability in analytical determination is maintained through strict adherence to quality control procedures. Procedures are designed to control both the accuracy and precision of analytical results. Depending on the level of certification of the data, a known method spike is routinely analyzed to ensure the accuracy of results. The procedure is to run the standard QA/QC and sample analysis with each lot of samples sent to the laboratory. If more than ten individual analyses are made, additional standards will be analyzed at a rate of one standard per ten analyses. Some procedures call for the use of either a surrogate spike or the standard addition of a known quantity of the analyte to a split of the sample being analyzed.

Control charts will be maintained by the laboratory using an estimate of the spike recovery obtained from the literature or determined by repeated analyses run in the laboratory. Each time the analyst runs a method spike, the results is entered on the control table. If a standard addition technique is used, a plot of instrument response versus added analyte concentration is made in order to determine analyte concentration in the original sample. These are further explained in the laboratory's quality assurance manual (QAM).

Replicate analyses will be performed on at least 10 percent of the samples processed by the laboratory. A record of the precision of most analyses is kept by calculating and plotting the industrial statistic I (which is equivalent to the coefficient of variation). Blanks are also run with each batch of samples or individual sample analyzed regardless of the level of certification of the data.

The purpose of spikes, blanks, and replicates is to provide a sound scientific basis from which the degree of certification of the resultant data can be objectively concluded. These are not management decisions, but follow naturally from the results of the above QC procedures.

Accuracy

Data accuracy is a reflection of the efficiency of the analytical procedure. It is determined by use of spiked samples and standard reference materials or laboratory control samples

performed at the rate of one set every 20 samples. A control chart is generated using historical laboratory data where warning and control limits are established to assess data accuracy.

The accuracy (check standards) samples will have concentration values of the mid-standard. During analysis, a minimum of 10 percent of samples must be accuracy samples. The accuracy samples must be staggered through the analysis, not placed one after another. After a minimum of seven accuracy samples are analyzed, the percent recovery is calculated for each sample.

The accuracy criteria is determined by calculating the standard deviation of seven or more percent recovery values and setting the upper and lower control limits using the following equations:

$$\begin{aligned}\text{Upper control limit} &= p + 3SD \\ \text{Lower control limit} &= p - 3SD\end{aligned}$$

Where:

$$\begin{aligned}p &= \text{Average percent recovery} \\ SD &= \text{Standard deviation}\end{aligned}$$

After the standard deviation, for the seven or more samples has been calculated, the accuracy control limits will be used to determine if the analysis is out of control. This is done by checking the results against the control limits. If any values are above the upper control limit or below the lower control limit, all sample results after the last qualifying accuracy sample must be repeated or discarded. If seven consecutive values fall below the lower control limit, new limits must be calculated using the new accuracy check values. If the values fall between the upper and lower limits, then conditions are reported as "within limits."

Recovery Control

Recovery control is necessary to determine if the sample matrix is interfering with the constituent being analyzed. A minimum 5 percent of samples will be recovery check samples (matrix spikes). Samples involving different types of matrices must have at least one recovery check for each type.

Control limits will be determined for each matrix, determining the deviation for seven or more percent recovery values.

Precision

Duplicate and replicate samples analyzed by the laboratory assess the precision of the sampling effort. Once a sufficient amount of replicate data becomes available, field precision control charts are constructed similar to the laboratory precision charts. For any given concentration, the mean and the standard deviation(s) of the replicates are calculated. The mean is the centerline of the control chart. Data from each sample set are pooled with the previous sample sets to generate control and warning limits for the next set. Warning and control limits for water samples are set at "2s and "3s, respectively. Control limits for solid samples are more liberally established due to matrix heterogeneity. Data outside any control limit are subject to QA review.

Precision is based upon the results of the relative percent differences as calculated from the percent recoveries of the matrix spike and duplicate samples. The control limits for precision is based on historical laboratory data.

Present practice is to include MS and MSD samples on a per batch basis or a minimum frequency of 5 percent. Duplicate results are compared and the relative percent difference (RPD) is then determined. The RPD will be entered into the laboratory's data system and will be used to define the precision of the analysis.

Completeness

The field supervisor is responsible for ensuring that all field instrumentation and equipment are functioning properly and calibrated according to set procedures, and that all data are recorded accurately and legibly. In addition, the field supervisor must ensure all sites are sampled for all the specified analyses, that sufficient sample volume has been provided to complete those analyses, and that all of the QA samples have been included with each sample set. The goal for completeness for each sample set shipped to the laboratory is 100 percent.

Completeness is expressed as the percentage of the amount of valid data obtained to the amount of data expected. For a set of data to be considered complete, it must include all QC data verifying its accuracy and precision.

If samples analyzed do not meet all QC requirements in terms of accuracy and precision for any specific parameter, the sample preparation and analysis will be repeated pending adequate volume.

Criteria for Rejection of Outlying Measurements

There are many statistical tests for rejection of outlying data points obtained from a set of measurements from a single population. A test recommended in Statistical Manual of the Associate of Official Analytical Chemists, 2nd Edition, W. J. Youden and E. H. Steiner, 1975, pg. 86, is the Dixon Test. This test is not dependent on the distribution of the data and can be used for as few as three measurements. A more complete description for this broadly applicable test can be found in the referenced text.

Another reference is the USEPA National Functional Guidelines for Data Validation of Organics and Inorganics. Also, specific programs may have quality objectives with criteria for rejection of outlying measurements.

Method Detection Limits and Practical Quantitation Limits

Method detection limits (MDLs) must be established by the laboratory. This should, at a minimum, be established on a yearly basis. MDL is the minimum concentration of a substance that can be identified, measured, and reported with 99 percent confidence that the analyte concentration is greater than zero.

Practical quantitation limit (PQL) is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. The PQLs are generally five to ten times the MDL. The PQL is the most applicable limit of reporting for this project. Minimum PQLs required for each site will be determined based on the action limits for that site and specified in the SAP addendum for each site.

Laboratory and Field Contamination

It is not unusual to find the following analytes at trace levels in the samples:

- Methylene chloride
- Acetone
- Freon (1,1,2-trichlorotrifluorethane)
- Bis(2-ethylhexyl)phthalate
- Hexane
- Isopropanol
- 2-Butanone

These are common solvents used in the field and in the laboratory.

In order to fully evaluate data containing trace levels of these contaminants, one must have data from trip blanks, field blanks, equipment blanks, and all applicable laboratory blanks for that batch of samples. The determination on the use of the data will be made during the data evaluation and validation processes.

2.7.4.5 Data Storage and Archive

After CCI has completed its work for the project, all documents generated will be assembled in the project file. Individuals may retain clean (no handwritten comments) copies of documents for their personal files but only after personally verifying that the original or similar copy is in the project file. The project manager/supervisor is responsible for ensuring the collection, assembly, and inventory of all documents relative to the project at the time the objectives are met. The file then becomes accountable. Any records leaving the file must be signed out.

When project objectives have been completed, all file documents are reviewed and submitted to the general file. The project file contains the following document classes:

- A. Project logbooks
- B. Drum logs and other forms
- C. Sample identification documents
- D. COC records
- E. Analytical logbooks, laboratory data, calculations, graphs, etc.
- F. Correspondence
 - Intra-office
 - Client
 - Regulating agencies
 - Record of confidential material
- G. Report notes, calculations, drafts
- H. References, literature
- I. Sample (on-hand) inventory
- J. Check-out logs
- K. Litigation documents
- L. Miscellaneous photographs, maps, drawings, etc.

Once deposited in the file, documents must be checked out.

The final report is usually generated by use of computer. A back-up copy of the report on diskette is filed along with the project file. The original report remains in the hard drive of the computer until such a time is required to download it on a diskette. This diskette is also archived.

All information under the corresponding project number is maintained in the archive system for a minimum of 5 years.

2.7.4.6 Sample Disposal

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

2.8 Performance and System Audits

Audit is defined as systematic check to determine the quality of operation of field and laboratory activities. It is comprised of performance audits and system audits. These include a detailed review of each operating component of the network. Auditing will ultimately assist in determining if each element within a system is functioning appropriately per the QA program requirements.

2.8.1 Field Performance Audits

Field performance audits are performed on an ongoing basis during the project as field data is generated, reduced, and analyzed. All numerical analyses, including manual calculations are documented. All records of numerical analysis are legible, of reproduction quality, and supporting to complete permit logical reconstruction by a qualified individual other than the originator.

Other indicators of the level of field performance are the analytical results of the blank, duplicate, and replicate samples. Each blank analysis is an indirect audit of effectiveness of measures taken in the field to ensure sample integrity. The results of the field duplicate and replicate analysis is an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

2.8.2 Field System Audits

System audits of site activities are accomplished by an inspection of all field activities by the Project QC Manager. This audit is composed of comparisons between current field practices and standard procedures. The following is a list of criteria to be used in the evaluation of field activities:

- Overall level of organization and professionalism
- All activities conducted in accordance with work plan

- All procedures and analyses conducted according to procedures outlined in this document
- Sample collection techniques versus the site SAP
- Level of activity and sample documentation
- Working order of instruments and equipment
- Level of QC conducted by each field team
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency which each team conducts planned activities at the site
- Sample packaging and shipment

After the audit, any deficiencies are discussed with the field staff, and corrections are identified. If any of these deficiencies might affect the integrity of the samples being collected, the Project QC Manager informs the field staff immediately, so corrections can be made. The field performance audit will be conducted at the start of the project, one before the end of the project, and as directed by the Project Manager.

CCI will also submit to all requests by regulatory agencies, or other clients for external field systems audits.

2.8.3 Laboratory Performance Audit

The laboratory performance audit verifies the ability of the laboratory to correctly identify and quantitate compounds in blind check samples submitted by an auditing agency. If the laboratory participates in Performance Evaluation (PE) programs such as USEPA Water Supply/Water Pollution (WS/WP) studies, American Industrial Hygiene Association (AIHA), Proficiency Analytical Testing (PAT) studies, etc., results from these studies will be generally acceptable by CCI. However, during the course of the project, it may be necessary for the program QA/QC manager to send PE samples to the laboratory to evaluate specific parameters.

The contracted laboratories will undergo performance audits throughout the project consisting of field QC samples. Occasionally PE samples will be supplied by the client or external organizations which will be spiked with the same analytical parameters that are being investigated onsite. External laboratory performance audits by auditing agencies such as the USEPA, USACE-MRD, DOD, NFESC, etc., are not routinely scheduled. However CCI and its subcontracted laboratories will submit to any external audit upon request by the USEPA or the client.

2.8.4 Laboratory System Audits

The laboratory system audit is a review of analytical laboratory operations to verify that the facility has the necessary equipment, staff, and procedures in place to generate acceptable data. It is also to determine that each element within an activity is functioning appropriately

and within the guidelines of applicable methodology, approved procedures, and the site QAPP. An onsite inspection is routinely performed by the laboratory's QA Manager and may also be frequently performed by the CCI Project QC Manager. If the laboratory participates in certification programs, audits performed by the certifying agencies may satisfy the criteria of systems audits for the project.

If the laboratory is in question, a system audit can be directed by the client and performed by CCI or the client's representative. Any recommendations made will be considered for implementation and any corrective actions will be taken to correct any deficiencies found. Project-specific audit reports will be placed in the project files and laboratory audit reports will be kept by the laboratory for future reference.

2.9 Corrective Action

Corrective actions may be necessary as a result of the following QA activities:

- Field and laboratory performance audits
- Field and laboratory system audits
- Inter-laboratory comparison studies
- Calibration data fall out of specified limits
- Failure to adhere to the SAP
- Failure to adhere to the site SAP addenda
- Failure to adhere to standard operating procedures and methods
- Data completeness below required limits
- Control limits are exceeded for QC samples

If, during system and performance audits, deficiencies or problems are discovered, corrective action will be initiated immediately. The appropriate field and laboratory personnel will be notified immediately an investigative process will be implemented immediately to find solutions to these issues. The investigative process will consist, but is not limited to, the following:

- Determining when the problem occurred
- Determining which systems were affected by the problem
- Determining the cause of the problem
- Determining a corrective action to eliminate the problem
- Assigning the responsibility for implementing the corrective action
- Implementing the corrective action
- Evaluating the effectiveness of the corrective action
- Investigating alternative corrective actions if the original action was not sufficient in eliminating the problem
- Documenting that the corrective action has eliminated the problem

The Project QC Manager has the authority to require that all site activities threatened by the problem be stopped or limited until the corrective action has been implemented and satisfactorily verified to eliminate the problem.

Corrective actions may include, but are not limited to:

- Modifications to procedures
- Recalibration of instruments
- Replacement of equipment, instruments, solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel

2.9.1 Corrective Action Report

A Corrective Action Report (CAR) is necessary documentation of the investigative process. Depending on the issues, the CAR may be generated by the laboratory or the field personnel. Copies of the CAR will be given to the program QA/QC Manager and Project Manager, who will distribute it to the client. A copy of the CAR will be placed in the project files for future reference.

The CAR should include, but is not limited to:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions
- Effectiveness of the resolutions
- Personnel responsible for implementation of the corrective action
- Personnel responsible for monitoring the effectiveness of the actions.

The Project Manager, Project QC Manager, and program QA/QC manager will converse on a regular basis to review possible and potential problem areas and to ensure that all QA/QC procedures are being carried out. It is important that all data abnormalities be investigated to ensure that they are not a result of operator or instrument deviation but are a true reflection of the methodology or task function. The project final report will contain a separate section that covers the data quality and validity. At a minimum, the following information will be included in the report:

- Assessment of measurement data precision, accuracy, and completeness
- System and performance audit results
- Significant QA problems and corrective actions implemented
- Copies of documentation such as memos, reports, etc.

3.0 Waste Management Plan

The scope of this plan addresses procedures for the management, transportation, and disposal of wastes generated during remedial activities at the NSA Mid-South. For purposes of this plan, the term waste includes solid waste, hazardous waste and/or wastewater, as well as materials and products that will be recycled, reclaimed or regenerated. Waste management forms are provided in Appendix C.

3.1 Wastestreams

Any wastes generated during remediation activities will be handled and disposed in accordance with the requirements of the Resource Conservation and Recovery Act of 1976, (RCRA), and the state of Tennessee waste management requirements.

Hazardous wastes will be managed in accordance with the hazardous waste requirements in 40 CFR 262 for large quantity generators, and Tennessee Department of Environment and Conservation (TDEC) waste management rules (Chapter 1200-1-11). The project workplan addenda will discuss any unique waste provisions and/or requirements (e.g., provisions for small-quantity generators as applicable or state-specific hazardous wastes).

3.2 Waste Characterization

While CCI will take measures to minimize the amount of waste generated, the nature of remediation activities will result in the generation of wastes. A hazardous waste determination will be made using process knowledge and laboratory analyses. The treatment, storage, recycling or disposal facility, or certain environmental regulations may require additional laboratory analyses. The analytical requirements are discussed in the Section 2.0 Sampling and Analysis Plan.

3.2.1 Hazardous Waste Characterization

CCI will determine whether a waste is a hazardous, as required under RCRA (40 CFR 261.11). A waste is hazardous if it is listed by the in 40 CFR Part 261, Subpart C and will be identified with one of the following 'listed' waste codes: "F", "K", "P", or "U". Listed hazardous wastes are defined by chemical nature and/or by the source of the waste. A waste would also be hazardous is it exhibits one or more hazardous characteristics presented in Table 1, and would be identified with the "D" waste code. The characteristic waste codes are described in Table 3-1.

TABLE 3-1
Hazardous Waste Characteristics

Waste Code	Characteristic	Regulatory Citation (40 CFR)	Examples																																																																																				
D001	Ignitability—easily ignites and oxidizes	261.21	Some spent chlorinated solvents																																																																																				
D002	Corrosivity—pH ≤2 or ≥12.5, able to dissolve metals or burn skin	261.22	Spent sulfuric battery acid																																																																																				
D003	Reactivity—capable of rapid chemical reaction, detonation, explosion, or generation of toxic fumes	261.23	Dry organic peroxide used as an accelerator in fiberglass repair																																																																																				
D004 - D043	Toxicity—waste contains specific contaminant in leachate extracted from waste using Toxicity Characteristic Leaching Procedure (SW-846 Method 1311)	261.24	<table border="0"> <tr><td>D004-Arsenic -----</td><td>5.0¹</td><td>D023-o-Cresol -----</td><td>200</td></tr> <tr><td>D005-Barium-----</td><td>100</td><td>D024-m-Cresol -----</td><td>200</td></tr> <tr><td>D006-Cadmium-----</td><td>1.0</td><td>D025-p-Cresol -----</td><td>200</td></tr> <tr><td>D007-Chromium-----</td><td>5.0</td><td>D026-Cresol -----</td><td>200</td></tr> <tr><td>D008-Lead-----</td><td>5.0</td><td>D027-1,4Dichlorobenzene -</td><td>7.5</td></tr> <tr><td>D009-Mercury-----</td><td>0.2</td><td>D028-1,2 Dichloroethane --</td><td>0.5</td></tr> <tr><td>D010-Selenium-----</td><td>1.0</td><td>D029-1,1Dichloroethylene -</td><td>0.7</td></tr> <tr><td>D011-Silver-----</td><td>5.0</td><td>D030-2,4Dinitrotoluene ----</td><td>0.13</td></tr> <tr><td>D012-Endrin -----</td><td>0.02.0</td><td>D031-Heptachlor -----</td><td>0.008</td></tr> <tr><td>D013-Lindane -----</td><td>10</td><td>D032-Hexachlorobenzene -</td><td>0.13</td></tr> <tr><td>D014-Methoxychlor ----</td><td>0.5</td><td>D033-Hexachlorobutadiene</td><td>0.5</td></tr> <tr><td>D015-Toxaphene -----</td><td>10</td><td>D034-Hexachloroethane</td><td>3.0</td></tr> <tr><td>D016-2,4-D -----</td><td>1.0</td><td>D035-Methyl ethyl ketone --</td><td>200</td></tr> <tr><td>D017-2,4,5-TP(Silvex) -</td><td>0.5</td><td>D036-Nitrobenzene -----</td><td>2.0</td></tr> <tr><td>D018-benzene -----</td><td>0.5</td><td>D037-Pentachlorophenol</td><td>100</td></tr> <tr><td>D019-carbon tetrachloride</td><td>0.3</td><td>D038-Pyridine -----</td><td>5.0</td></tr> <tr><td>D020-Chlordane -----</td><td>100</td><td>D039-Tetrachloroethylene -</td><td>0.7</td></tr> <tr><td>D021-Chlorobenzene --</td><td>6.0</td><td>D040-Trichloroethylene -</td><td>0.5</td></tr> <tr><td>D022-Chloroform -----</td><td></td><td>D041-2,4,5-Trichlorophenol</td><td>400</td></tr> <tr><td></td><td></td><td>D042-2,4,6-Trichlorophenol</td><td>2.0</td></tr> <tr><td></td><td></td><td>D043-Vinyl chloride -----</td><td>0.2</td></tr> </table>	D004-Arsenic -----	5.0 ¹	D023-o-Cresol -----	200	D005-Barium-----	100	D024-m-Cresol -----	200	D006-Cadmium-----	1.0	D025-p-Cresol -----	200	D007-Chromium-----	5.0	D026-Cresol -----	200	D008-Lead-----	5.0	D027-1,4Dichlorobenzene -	7.5	D009-Mercury-----	0.2	D028-1,2 Dichloroethane --	0.5	D010-Selenium-----	1.0	D029-1,1Dichloroethylene -	0.7	D011-Silver-----	5.0	D030-2,4Dinitrotoluene ----	0.13	D012-Endrin -----	0.02.0	D031-Heptachlor -----	0.008	D013-Lindane -----	10	D032-Hexachlorobenzene -	0.13	D014-Methoxychlor ----	0.5	D033-Hexachlorobutadiene	0.5	D015-Toxaphene -----	10	D034-Hexachloroethane	3.0	D016-2,4-D -----	1.0	D035-Methyl ethyl ketone --	200	D017-2,4,5-TP(Silvex) -	0.5	D036-Nitrobenzene -----	2.0	D018-benzene -----	0.5	D037-Pentachlorophenol	100	D019-carbon tetrachloride	0.3	D038-Pyridine -----	5.0	D020-Chlordane -----	100	D039-Tetrachloroethylene -	0.7	D021-Chlorobenzene --	6.0	D040-Trichloroethylene -	0.5	D022-Chloroform -----		D041-2,4,5-Trichlorophenol	400			D042-2,4,6-Trichlorophenol	2.0			D043-Vinyl chloride -----	0.2
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		D043-Vinyl chloride -----	0.2																																																																																				

1 All units in (milligrams per liter (mg/L))

3.2.2 Land Disposal Restrictions

If a waste is determined to be hazardous, CCI will address RCRA LDR requirements for that waste. In general, hazardous wastes that will be land disposed must meet certain treatment standards (either a specified technology or a specified concentration). CCI will prepare an LDR notification or certification form for Navy signature for all hazardous waste that sent offsite or treated onsite to meet LDR standards. The components of the LDR program are:

1. Determine the appropriate waste codes that apply to the wastes. (Some listed wastes may also carry a characteristic waste code).

2. Determine which constituents to analyze, i.e., constituents associated with a waste code. For most characteristic hazardous wastes, the "underlying hazardous constituents" must also be determined (defined in 40 CFR 268.48).
3. Determine if the waste is a wastewater or non-wastewater. For the LDR program, wastewater is defined as a waste that contains less than 1 percent by weight total organic carbon and less than 1 percent by weight total suspended solids (40 CFR §268.2).
4. Determine if the waste meets the LDR treatment standards identified in 40 CFR §268.40 and §268.48. (Treatment standards may be expressed as either concentration limits, or the use of one or more specified treatment technologies).
5. Prepare one of the following forms:
 - Certification that a waste meets the LDR treatment standards
 - Notification that the does meet the LDR treatment standards

3.3 Waste Documentation

Waste characterization information will typically be included on a waste profile form provided by the offsite facility. CCI will provide analytical data from the most recent characterization sampling and analysis event. However, in some cases, facilities permitted to accept a specific waste material might require specific or additional analyses to evaluate the wastestream prior to acceptance.

Where certifications and signatures are required (e.g., for waste manifests, Land Disposal Restriction forms), Navy personnel will sign as the waste generator. An approved copy of the waste profile form, signed by a representative of the facility approved to accept the waste material, will be received prior to offsite transportation of the material.

Uncontaminated construction and demolition (C&D) wastes, such as excavated concrete and scrap metal, are considered inert materials. The disposal or recycling facilities may require some characterization information, but generally do not require laboratory analysis.

A log of all generated wastes will be maintained at the site. At a minimum, the log will include the type of waste, source of waste, quantity of waste, waste accumulation start date, sampling data, and disposal information.

3.4 Waste Management

Wastes generated from remediation activities at NSA Mid-South will be managed in one of the following units:

- Roll-off containers
- Stockpiles
- Portable tanks
- Containers/drums

CCI will manage these wastes in a manner that prevents a release of contaminants to the environment, and consistent with the procedures described below.

3.4.1 Waste Storage Time Limit

Wastes will be securely stored in containers or stockpiles at an onsite location where access is controlled. Containers include drums (e.g., 55-gallon drums), portable tanks, and roll-off containers.

It is CCI policy to remove hazardous wastes from a site as soon as possible, and generally within 45 days from the date of generation. The 45-day timeframe allows approximately 30 days for sample analysis/results review and 15 days to arrange for waste transportation. The date of generation (or the start of the 45-day accumulation period) is the date that a waste is first placed in a tank, container, or in a stockpile:

- Excavated soil – the storage ‘clock’ starts when the soil is placed in a roll-off container or in a stockpile.
- Solid or liquid waste – the clock starts when the waste is placed in a drum, tank, or other container.

3.4.2 Labels

Containers (including drums, tanks, and roll-off containers) used to store/accumulate waste (including soil and groundwater) will be clearly labeled prior to storing any waste, as follows:

- “Analysis Pending” - temporary or handwritten label until analytical results are received and reviewed. This label will include the accumulation start date.
- “Hazardous Waste”. Pre-printed hazardous waste labels will be used. Information on label will include:
 - 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.
- “Non-Hazardous Waste”. Preprinted labels will include:
 - Accumulation start date
 - Generator Name: U.S. Navy
 - EPA ID Number
 - Waste-specific information (e.g., petroleum waste)

Where applicable, the major hazards on the label (e.g., flammable, oxidizer, and carcinogen) will be included on the label.

3.4.3 General Storage Area Requirements

Waste will be securely stored onsite prior to transportation and treatment or disposal. Hazardous wastes will be segregated from non-hazardous wastes. Additionally, incompatible wastes will be segregated (e.g., flammable and corrosive wastes). Wastes will also be compatible with the container. Wastes of the same matrix, contamination, and the

same source may be aggregated to facilitate storage and disposal. Hazardous wastes shall only be aggregated if from the same source and if carrying the same hazardous waste codes. In any case, hazardous wastes will not be diluted.

3.4.3.1 Roll-off Containers

- Roll-off containers will be inspected upon arrival onsite. Any roll-off containers arriving with contents will be rejected.
- Liners will be provided for roll-off containers in the following cases:
 - Hazardous soils or debris
 - Soil or debris which contains or appears to contain excessive product/sludge/water (e.g., fails paint filter test).
- Liners will be disposed of as contaminated debris.
- Roll-off containers for soils and debris will be provided with covers. When not in use, securely fastened covers will be installed on all roll-off containers.
- 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.

3.4.3.2 Stockpiles

Prior to using stockpiles for hazardous waste, CCI shall obtain approval from the Navy and/or the Base Closure Team (BCT). The following procedures shall be followed when stockpiling all soils:

- Stockpiles shall be located near the excavation areas and within the area of contamination.
 - Stockpiles shall be provided with a liner, cover, and perimeter berm to prevent release or infiltration of liquids.
 - The perimeter berm, typically hay bales placed beneath the liner, shall be constructed to allow for collection of any free liquids draining from the stockpile.
 - Accumulated free liquids shall be pumped (or otherwise removed) to a container.
 - Covers shall be provided as necessary to prevent wind dispersion or run-on/run-off from precipitation events.
 - Minimum 6-mil polyethylene sheeting shall be used for liners and covers.
- Covers and perimeter berms shall be secured in-place when not in use and at the end of each workday.
- Construction materials for the stockpiles that contact waste shall be disposed of as contaminated debris.
- A log documenting accumulation dates shall be maintained for soils and other waste stored onsite in stockpiles.

3.4.3.3 Drums/Small Containers

- 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 two 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 hazardous waste or hazardous wastes that are incompatible with other wastes or materials stored nearby.

3.4.3.4 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 for liquids will be provided with covers.
- Each tank will be labeled.
- Tanks containing hazardous waste or incompatible liquids will be provided with secondary containment.
- Secondary containment will be provided for hazardous waste.

3.4.4 Storage Area Inspections

During operations, areas used for storage and containers (tanks, roll-off containers, and drums) will be inspected for malfunctions, deterioration, discharges, and leaks that could result in a release. In general, CCI shall inspect waste storage areas according to the following frequency:

- Daily inspection of containers that are stored onsite (for leaks, signs of corrosion, or signs of general deterioration).
- Daily inspection of onsite tanks (for leaks, signs of corrosion, or signs of general deterioration).
- Daily inspection of fuel storage areas (e.g., look for eroding containment systems and rusting tanks/ancillary equipment)
- Daily inspection of open excavations for sudden drop in level of accumulated water, overflow (especially after a storm), and for proper functioning of run-on and run-off controls.

- Daily inspection of stockpiles (as appropriate) for integrity/proper functioning of cover and proper functioning of run-on and run-off controls.
- Weekly inspection of fuel storage areas (e.g., look for eroding containment systems and rusting tanks/ancillary equipment.)

3.5 Waste 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.

3.5.1 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 (e.g., petroleum contaminated waste)
- Type of container
- Quantity of waste (volumetric estimate)

Additionally, each wastestream transported offsite will also have a waste profile, Land Disposal Restriction notifications/certifications (as applicable), and haul ticket.

If the signed 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 manifest has not been received within 45 days, CCI will issue an "Exception Report" to the state of South Carolina, as required under 40 CFR 262.42.

3.5.2 Transporter Responsibilities

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.
- Follow safety and spill response procedures outlined in the HSP.
- Seal trucks transporting liquids.

No materials from other projects will be combined with materials from NSA Mid-South.

3.5.3 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 a NSA Mid-South representative.

3.5.4 Waste Disposal

Wastes or materials that are transported offsite will be treated, disposed, or recycled. Whenever possible, wastes and/or materials (for example, scrap metal) will be recycled in lieu of land disposal. Information on the offsite facilities will be obtained prior to offsite transportation of the waste (or material).

- **Non-Hazardous Solid Waste and Soil** will be sent to a permitted RCRA Subtitle D (or state equivalent) disposal facility or to facilities permitted to dispose of petroleum-contaminated soil or waste. Petroleum contaminated soil or waste may also be sent to a licensed fuel recovery/reclamation facility.
- **Water** will be sent to a permitted water treatment and discharge facility. In some instances, water from remediation activities may be discharged onsite (e.g., under Clean Water Act General Permits). Information on these types of activities will be provided in the specific work plan addenda.
- **Hazardous Wastes** will be sent to RCRA Subtitle C (or state equivalent) permitted facilities.

3.6 Training

Training requirements for onsite personnel, including subcontractors, is provided in the site-specific HSP.

3.7 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
- Training records
- Inspection records
- Material Data Safety Sheets (MSDS) for chemicals brought onsite.

4.0 Environmental Protection Plan

The scope of this plan includes general controls implemented during remediation-related construction activities at NSA Mid-South to prevent pollution and protect the environment. These controls and procedures also ensure that work is performed in a manner that meets the intent of federal, TDEC, and local environmental regulations. The work plan addenda will provide task-specific requirements for environmental protection and pollution control.

4.1 Regulatory Drivers

The following environmental laws and regulations are the drivers for the remediation activities at NSA Mid-South:

The following environmental laws and regulations are the drivers for the remediation activities at NSA Mid-South:

- RCRA/ TDEC hazardous waste regulations
 - Identification, storage, treatment, recycling, and disposal of solid and hazardous wastes
 - Cleanup of Solid Waste Management Units (SWMUs).

4.2 Protection of Air Resources

Construction activities will be kept under surveillance, management, and control to minimize the discharge of any air pollutants. The following general practices will be implemented to protect air resources:

- Construction equipment will be maintained within manufacturer's design limits to ensure minimal discharge of exhaust emissions.
- Dust emissions will be controlled during earth disturbing activities using water truck or hose nozzle spray applications of water.
- Traffic routes will be designated to limit the area that is disturbed.
- Haul roads will be maintained and watered to reduce dust, as necessary.
- Travel speeds over unpaved areas will be limited to reduce dust levels.
- Completed areas will be seeded or otherwise stabilized to reduce dust levels.
- Burning will not be allowed as a means of clearing.
- Equipment will be operated in such a manner as to minimize airborne particulates whenever possible (e.g., the drop height of excavators will be limited).

Emission controls that are required by state or federal permits or to protect the environment during a particular remediation activity (e.g., carbon filters on treatment units) will be discussed in the task-specific workplan.

4.3 Protection of Water Resources

The primary water resource concern during construction activities is the control of storm water run-on and run-off. Other water resource issues such as discharges to a waterway, construction activities in a floodplain, wetlands, or streambed (and associated permits and permitting requirements) will be discussed in the task-specific work plan addenda.

To reduce erosion, and control stormwater run-on and run-off during any activity that will disturb that land, the following structural and non-structural controls will be implemented as appropriate:

- Minimizing the area of bare soil exposed at one time (i.e., phased grading)
- Stabilizing cut-and-fill slopes
- Perimeter controls (e.g., drainage diversions)
- Stormwater retention basins
- Sediment basins and traps
- Silt fences at excavations
- Covers for stockpiles (to prevent leaching of contaminants from stockpiles)
- Site restoration (e.g., regrading, mulching, and seeding, or repaving with asphalt or concrete)

4.4 Protection of Land Resources

Land resources (e.g., trees and shrubs) will be preserved in their present condition or restored as near as possible to their natural appearance. Trees outside of any clearing limits will be protected during excavation or filling activities within the root zone, wherever possible. No ropes, cables, or guy lines will be fastened to or attached to any existing trees for anchorage unless specifically authorized by the Navy. Where authorized, the trunk will be wrapped with sufficient thickness of a material such as burlap or rags over which softwood cleats will be tied before any rope, cable, or wire is placed. Where trees may be defaced, bruised, injured, or otherwise damaged by equipment or construction operations, boards, planks, or poles may be placed around them for protection. Rocks that are displaced into uncleared areas will be removed. Monuments, markers, or other similar structures will be protected before beginning construction operations.

4.5 Protection of Fish and Wildlife

Construction operations will be managed in such a manner as to minimize interference with fish and/or wildlife habitat. Care will be taken to ensure that temporary erosion and sediment controls are installed to prevent storm water discharges to any adjacent ponds or wetlands. Construction operations will be monitored and reorganized as necessary to prevent negative effects to identifiable wildlife activity.

4.6 Chemical Inventory and Control

Consistent with the requirements of Section 311 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 4.8.7 of the contract, CCI will maintain an inventory of chemicals and hazardous materials brought onsite.

The project manager is to request Material Safety Data Sheets (MSDSs) from the client or from the contractors and the subcontractors for chemicals to which CCI employees potentially are exposed. The Site Health and Safety Supervisor performs the following activities:

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

More detailed procedures for chemical and hazardous material inventory and control are provided in the Basewide HSP.

4.7 Spill/Release Prevention, Control, and Reporting

To prevent and control spills and releases, hazardous materials will be handled in accordance with CCI procedures outlined in the Basewide HSP.

In the event of a 'release' of any potentially hazardous waste, chemical, or material, CCI will report any release of to the Contracting Officer or designated representative as indicated in the Basewide HSP. CCI will also record. The definition of release includes any "spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed containers)" of any potentially hazardous chemical, substance, and/or material. The Basewide HSP identifies the hazardous chemicals and materials anticipated to be used in work at NSA Mid-South. The CCI Regulatory Compliance Manager shall be contacted for questions on other chemicals and/or materials.

4.8 Site Restoration

The specific requirements for restoring a construction area will be described in the work plan addenda. In general, site restoration activities will include the following activities:

- Decontaminate facilities, equipment, and materials prior to final removal from the site.
- Upon completion of final decontamination, remove any decontamination support features (such as a pad, wash units). Properly dispose of any items that cannot be

decontaminated and/or materials (such as plastic sheeting) used in decontamination activities.

- Remove all temporary construction features, such as haul roads, work areas, stockpiles, structures, fencing, and waste staging or storage areas in accordance with project requirements and directions provided by Navy representative.

The physical restoration of the construction area generally involves the following activities:

- Backfill placement
- Finish filling and grading
- Topsoil placement and amendments
- Seeding

If necessary, CCI may consult the county extension office for direction on appropriate seed mixtures and soil amendments for NSA Mid-South.

5.0 Health and Safety Plan

CCI is submitting a Basewide Health and Safety Plan for all petroleum, oil and lubricants (POL) projects and projects with PCB, metals, and solvents as possible contaminants of concern, completed at NSA Mid-South. This HSP contains procedures and protocols pertaining to personnel and public health and safety issues encountered during the environmental restoration projects. It is through the implementation of this HSP (presented in Appendix A), along with CCI's overall Health and Safety Program, that site hazards and risks with regard to remediation activities will be controlled and minimized.

This Basewide HSP will be supplemented with CTO site-specific information included in each CTO-specific Work Plan Addendum.

6.0 Quality Control Plan

6.1 Purpose

NSA Mid-South remedial actions conducted as part of the CCI Southern Division RAC will be executed in accordance with a quality control plan developed and implemented in accordance with Part 6, Quality Control, of the contract and Appendix B of the CMP. Contained within this document are direct and edited excerpts from existing manuals and documents, as well a number of standard forms were incorporated to ensure existing standards of quality are met or exceeded during the conduct of operations required by the CCI Southern Division RAC. In addition to the excerpts, are references to manuals, documents, and procedures.

This CTO Quality Control (QC) Plan has been developed using the Quality Control Program document as guidance. Individuals assigned to the CCI Southern Division RAC program, including CTO projects, will be able to refer to this document to familiarize themselves with the contract requirements and obtain direction on how to accomplish specific tasks within the CCI Southern Division RAC, including CTO projects.

The quality control program document, and this CTO QC Plan, will serve as the basis for identification and implementation of enhancements and/or improvements to the CTO QC Plan itself. This approach is in keeping with firmwide total quality processes and will be accomplished by the feedback process identified within the CMP.

As a matter of corporate policy, CCI is committed to fulfill or exceed our clients' needs and to meet necessary and sufficient regulations and standards of the engineering profession and construction industry. This quality commitment applies to all work conducted by CCI, inclusive of all engineering, scientific, economic, design, and construction activities.

Individuals performing work under the CCI Southern Division RAC, CTO projects inclusive, and under CCI's overall Quality Management Plan, and QC Plans, are responsible for the quality of their work and for the implementation and adherence to applicable quality procedures consistent with the principles of continuous quality improvement and total quality leadership (TQL).

6.2 Scope

Establish and maintain a Basewide QC plan comprised of:

- A QC organization
- A project (CTO) level plan incorporating the three phases of control
- Definition of contractually required meetings
- Development of submittal processing procedures

- Identification of testing standards and requirements
- Establishment of a complete inspection process
- Processes which address certifications and documentation necessary to provide contractually compliant materials, equipment, workmanship, fabrication, construction, and operations

The overall objective of the program level plan and the CTO QC Plan is to establish the guidance appropriate to direct individuals in the quality performance of their tasks, inclusive of preparation and implementation of all CTO level plans. To this end, the strategy of the quality management program is to eliminate major work product defects and to limit minor defects, thereby achieving client satisfaction, while minimizing professional liability exposure. Quality management is a continuous process underlying all aspects of project management, including project staffing, client liaison, project planning and execution, coordination, and the control of schedule, cost, and deliverables.

6.3 Acronyms and Definitions

Definitions of most of the unique terms used within the CTO QC Plan are presented within the body of the guidelines contained in this CTO QC Plan. Definitions along with frequent acronyms used within this CTO QC Plan and/or other CTO documents include:

6.3.1 Acronyms

ASTM – American Society for Testing and Materials
 BRAC – Base Realignment and Closure
 CAM – Contract Administration Manager
 CCI – CH2M HILL Constructors, Inc.
 CMP – Contract Management Plan
 COE – Corps of Engineers
 CTO – Contract Task Order
 DOR – Designer of Record
 EFA – Engineering Field Activity
 EFD – Engineering Field Division
 EPA – Environmental Protection Agency
 ER,N – Environmental Restoration, Navy
 HSM – Health and Safety Manager
 IRP – Installation Restoration Program
 NSA - Naval Support Activity
 PM – CTO Project Manager
 PMO – Program Management Office
 QAO – Quality Assurance Officer
 QC – Quality Control
 QCPP – Quality Control Program Plan
 QCM – Quality Control Manager
 RAC – Remedial Action Contract
 ROICC – Resident Officer in Charge of Construction
 SHSS – Site Health and Safety Specialist (aka: SSC – Site Safety Coordinator)
 SPM – Program Senior Project Manager

6.3.2 Definitions

Shop Drawings – Drawings, schedules, diagrams, and other data prepared specifically for this contract by CCI, subcontractor, manufacturer, supplier, distributor, or lower tier provider, to illustrate a portion of the work.

Product Data – Preprinted material, such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data used to illustrate a portion of the work, but not prepared exclusively for this contract.

Samples – Physical examples of products, materials, equipment, assemblies, or workmanship, physically identical to a portion of the work, illustrating a portion of the work or establishing standards for evaluating the appearance of the finished work, or both.

Administrative Submittals – Submittals of data for which reviews and approval will be required to ensure that the administrative requirements of the project are adequately met, but not to ensure directly that the work is in accordance with the design concept and in compliance with the contract documents.

Submittal Register – That specific document of a prescribed format which is used to establish and define required submittals, record their status, and monitor the submittal process.

Day – Generally construed as a work day unless stipulated as a calendar day.

Lead Engineer – Project Submittal Quality Administrator; that person on the project team assigned the task of managing the submittal process. They are also specifically charged with the responsibility for developing, maintaining, and monitoring the submittal register and coordinating project submittal requirements with the PM and Project QC Manager.

Project QC Manager – Person responsible for Quality Control on a specific CTO.

Resident Engineer – The onsite competent technical authority designated by the PM.

Designer of Record - The entity responsible for design of the remedial action implemented through the requirements of a CTO.

6.4 Responsibilities

The QCM is responsible for oversight of activities conducted under the guidance of the QCPP, which includes the CTO QC Plan. This responsibility includes periodic reviews of the processes implemented under this portion and the evaluation of any recommendations made by the project team over the course of the project regarding use of these processes.

The Project Submittal Quality Administrator is that person on the project team assigned the task of managing the submittal process. They are also specifically charged with the responsibility for developing, maintaining, and monitoring the submittal register and coordinating project submittal requirements with the PM and Project QC Manager.

The Project QC Manager is responsible to the QCM for managing CTO site specific QC requirements in accordance with the CTO QC Plan. The Project QC Manager will develop

the CTO QC Plan while reviewing and becoming familiar with CTO requirements. The Project QC Manager will submit the CTO QC Plan to both the QCM and PM for review and approval. This position requires a thorough understanding of construction and chemical quality control, as well as a clear understanding of the three phases of control and project documentation. Submittal reviews under the auspices of the program QC team will be conducted by the Project QC Manager. The responsibility for oversight and coordination of all testing activities, certifying the appropriate aspects of QC activities, and attendance at and preparation of minutes for the QC Meetings and the Coordination and Mutual Understanding Meeting all befall the Project QC Manager. The Project QC Manager carries tremendous responsibilities and serves a critical role in the successful performance of the CCI Southern Division RAC and CTO requirements. Under certain circumstances, as defined in the contract documents, the Project QC Manager may also serve as the Site Health and Safety Specialist (SHSS).

The Site Superintendent is responsible to the PM for executing the construction phase of a specific CTO and for efficiently applying the resources of the project team. The Site Superintendent is responsible for all technical, personnel, construction methodology, quality, safety, and local client interface details of the project and the project team while mobilized to the CTO site. Site Superintendents must manage, lead, and control their projects. They manage the site activities to be performed on behalf of the Navy, they lead the project team so the work is done efficiently and correctly, and they control the use of resources to meet project objectives within the authorized budgets. The Site Superintendent must also be actively involved in the oversight and guidance of subcontractor efforts. The Site Superintendent's objective is to produce a quality work product within the authorized schedule and budget. To accomplish this goal, the Site Superintendent does the following:

- Develops, with the PM, HSM, and QCM, the objectives, expectations, and scope of the work to be performed
- Plans the approach to the CTO and documents this approach in the project work plan for authorization by the PM and SPM
- Identifies staff and other resources needed to execute the CTO and establishes clear lines of communication within the organization
- Organizes, directs, and controls site personnel and resources
- Coordinates and communicates with the PM, Project QC Manager, and SHSS as necessary to keep them fully informed of the work plans and progress
- Attends Coordination and Mutual Understanding meeting
- Attends Quality Control meetings
- Reviews the project work plan regularly
- Continuously monitors work progress, quality, safety, and adherence to authorized budgets and schedules

The Quality Control Administrator is that person responsible for supporting the daily quality control operations in the Program Management Office (PMO). Reporting to the QCM, this individual supports the program and CTO projects by coordinating deliverables

with the Lead Engineer and PA; assisting in the preparation and review of CTO QC plans; assisting in the preparation and review of CTO work plans; assisting in the preparation and review of site health and safety plans; confirming that documents are being properly stored within the electronic and printed document control protocols established for the program and CTO; supporting Project QC Managers and PMs with submittal review; assisting the QCM in conducting project audits; and performing other duties as assigned by the QCM or Program Manager.

6.5 Guidelines

6.5.1 QC Implementation

6.5.1.1 Project Quality Control (QC)

Various sections within Part 6.0 of the contract stipulate the requirements for quality control at the CTO level. Addressed within this section of the CTO QC Plan are specific activities associated with the CTO QC Plan, the three phases of control, project meetings, reporting, and testing. The Project QC Manager will be responsible for development and implementation of the CTO QC Plan.

6.5.1.2 Project Quality Control Plan

Critical to the effective execution of the CTO is effective development and implementation of a CTO QC plan. The plan itself has a number of specific requirements that are satisfied before fieldwork commences. Because of the very nature of the work to be conducted under the CCI Southern Division RAC, the CTO QC plan is an integral part of the CTO work plan. And addresses both offsite and onsite activities.

The following items are addressed in the CTO QC Plan Addendum:

- Resume of the proposed CTO Project QC Manager
 - The resume will clearly convey the qualifications of the proposed candidate.
 - The candidate for the Project QC Manager position may be the same proposed as the Site Superintendent or SHSS, provided that the scope of the CTO is such that will allow for part-time assignment to each task.
- Appointing letter for proposed Project QC Manager
 - Signed by an officer of CCI
 - Clearly stated in the letter will be the assignment of responsibility for development and implementation of the CTO QC Plan, appropriate references to be used in development and implementation of the plan, reporting hierarchy for the project, and the delegated authority to direct correction of non-conforming work
- Testing requirements associated with the CTO
 - Identification of the testing laboratory(ies) required to support the CTO
 - Testing plan that clearly identifies required tests, inclusive of chemical, confirmatory, construction quality, and materials
- List of outside organizations supporting CCI in delivery of the CTO

6.5.1.3 Three Phases of Control

The Navy has established a precise three-phase protocol involving project execution that must be implemented throughout delivery of the CCI Southern Division RAC. Intended through application of the protocol is enhanced quality and corresponding documentation of the quality process for each definable feature of work. The process formalizes specific actions that are prudent to delivery of any and every CTO, and establishes guidelines that allow CCI as the project delivery agents to better know and understand the Navy's expectations.

Preparatory Phase

The preparatory phase is that step in delivering the CTO that essentially culminates the planning and design process leading up to actual remediation of a specific site or sites. It also serves to assure that the CTO delivery, QC, and safety plans have been completed and are ready to be implemented. The following events take place for each definable feature of work established by the PM:

1. Confirm that the appropriate technical specifications are incorporated into the project work plan and review specifications with the Site Superintendent and responsible foreman.
2. Confirm that the appropriate contract drawings are incorporated into the project work plan and review drawings with the Site Superintendent and responsible foreman.
3. Verify with the Site Superintendent and responsible foreman that all shop drawings and submittals have been approved by the proper approving authority (including factory test results, when required).
4. Confirm with the Site Superintendent and responsible foreman that the testing plan coincides with the work plan and that adequate testing is called for to assure quality delivery.
5. Confirm definition of preliminary work required at the CTO work site and examine the CTO work area with the Site Superintendent and responsible foreman to confirm required preliminary work has been properly completed.
6. Confirm availability of required materials and equipment. Examine materials and equipment with the Site Superintendent and responsible foreman to confirm compliance with approved submittals. Examine mock-ups and any sample work product to confirm compliance with approved submittals.
7. Review the site health and safety plan and activity hazard analysis with the Site Superintendent and responsible foreman to ensure that safety concerns are adequately addressed and applicable safety requirements have been incorporated into the plan. Confirm that the appropriate MSDSs have been identified and properly submitted.
8. Discuss with the Site Superintendent and responsible foreman construction methods to be employed during the remedial action. Identify checkpoints and areas of evaluation that will allow determination that the appropriate quality of construction is being achieved.

Execution of the preparatory phase must follow notification to the Contracting Officer, or designated representative, no less than two working days prior to conducting the

confirmatory reviews. Additionally, results of the activity are to be documented in the daily Contractor Quality Control Report.

Initial Phase

The initial phase occurs at the startup of remedial activities, or construction, associated with a specific definable feature of work. Essentially, the initial phase confirms that the CTO QC Plan is being effectively implemented and the desired results are being achieved. As is the case with the preparatory phase, proper notification to the Contracting Officer is required before initiating site activity. With the initial phase, notification that the crews are ready to start a particular definable feature of work is required prior to their actual start. In the case of initial CTO activity, however, the coordination and mutual understanding meeting will be conducted prior to beginning work. The request to schedule the meeting may also serve as notice of the intent to start a particular CTO/definable feature of work.

Specific details associated with the initial phase are:

1. Establish the quality of workmanship required to properly deliver the CTO in accordance with contract requirements. The Project QC Manager assures that the appropriate supervisors have made the work crews aware of expectations associated with the construction methods established under the preparatory phase. This assurance is to be achieved via observation of the initial work activities as well as interaction with the Site Superintendent and responsible foreman.
2. Resolve conflicts. The Project QC Manager will serve to guide the Site Superintendent and responsible foreman in resolving conflicts. Should conflicts arise in establishing the baseline quality for the definable feature of work, the responsibility to resolve the conflict falls to the Project QC Manager. Should the conflict not be resolved in a manner that satisfies the contract requirements, the Project QC Manager must elevate the conflict to the program level (Program Quality Control Manager [PQCM]) and issue a non-compliance notice (see Section 3.7 of the CMP). Should the issue jeopardize the results of the definable feature of work, or put the CTO at risk of non-compliant performance, the Project QC Manager may direct a cessation of work activity.
3. Evaluate the site health and safety plan and activity hazard analysis against actual work conditions with the Site Superintendent and responsible foreman to assure that the hazard analysis conducted to prepare the safety plan adequately addressed field conditions. Confirm applicable safety requirements are being implemented during construction activities.
4. Observe and evaluate the performance of testing technicians. Confirm with the Site Superintendent and/or responsible foreman that testing is being performed in accordance with the testing plan and that required protocols are being observed. Review reports and documentation associated with extraction, packaging, transporting, and testing of samples. Note discrepancies and direct correction accordingly.

Upon completion of the initial phase activities, results are to be documented in the daily Contractor Quality Control Report.

Follow-Up Phase

Completion of the initial phase of quality control activity then leads directly into the follow-up phase, which addresses the routine day-to-day activities on the project site. Inspection

activities associated with each definable feature of work are to be addressed within the Daily Contractor Quality Control Report. Specific concerns associated with the follow-up phase include:

1. Inspection of the work activity to assure work is in compliance with the contracted remedial action
2. Evaluation and confirmation that the quality of workmanship is being maintained at a level no less than that established during the initial phase
3. Evaluation and confirmation that required testing is being performed in accordance with procedures established during the preparatory phase and confirmed during the initial phase
4. Confirmation that non-conforming work is being corrected promptly and in accordance with the direction provided by the Project QC Manager

Offsite Activities

Initiation of activities in either the preparatory or initial phase that are conducted away from the CTO project site must be preceded by notification to the Contracting Officer. This notification is to occur no less than 2 weeks prior to start of the work. The PM must include offsite activities in the project schedule to ensure that the Project QC Manager may provide the correct notice to the Contracting Officer.

6.5.1.4 Definable Features of Work

A list of the definable work features for the restoration projects is provided below:

- Site preparation
- Soil excavation in designated areas, screening, stockpiling, backfilling, and re-vegetation
- UST removal/in-place closure activities to include content removal, purging, excavation, removal, confirmation testing, transportation, disposal, and backfill
- Transport and treatment of contaminated soil and water.
- Well installation to include air sparge, groundwater recovery, and free product recovery wells
- Environmental Sampling
- Trenching to include all utility trenching and pipe trenching related to remedial activities such as horizontal vapor extraction systems and fluid transport piping, associated bedding, pipe/screen placement, backfill and compaction, and re-vegetation where required
- Foundation construction to include required footing excavation, forming, reinforcing and concrete placement
- Remediation system building construction
- Equipment installation to include free product, groundwater, and/or soil treatment equipment installation and associated appurtenances such as blowers, moisture

separators, pumps, storage tanks, aerators, carbon treatment systems, air compressor, equalization tank(s) and utility hook up

- Paving to include grading and compaction, curb and gutter placement, as well as both asphalt and concrete paving activities.
- System start-up and operations and maintenance activities.

A definable feature of work not included in this list that is an integral element of the site-specific construction activities will be provided in the CTO work plan addenda.

Site Preparation

Site preparation activities includes clearing, grubbing, permitting as well as staging of equipment and material necessary to begin work.

Preparatory Phase

The preparatory phase will include a review of the construction drawings, work plan, specifications, submittal status, and confirmation of appropriate materials.

Initial Phase

Inspections will be made as necessary to assure construction limits are adequately cleared, utilities marked, and material staged in the designated areas.

Follow-up Phase

The Project QC Manager will provide continuous oversight of the site preparation activities to verify that the work is completed in accordance with the construction drawings, specifications, and requirements provided in the work plan. Daily observation will verify compliance with the technical specifications and the requirements provided in this work plan. Deficiencies will be noted and corrected.

Soil Excavation, Screening, Stockpiling, and Backfilling Activities

Preparatory Phase

The preparatory phase will include a review of the construction drawings, requirements provided in the work plan, and specifications; review of the proposed excavation area including depth based on the analytical results from pre-excavation sampling activities; verifying acceptance and approval of the excavation permit from the ROICC office; verifying the submittal approval; confirming acceptability of the backfill and other required materials; and confirming that appropriate equipment and craftsmen are available to complete the work.

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

Effectuated personnel at each facility where soil excavation is proposed will be contacted prior to mobilization to allow time to move vehicles which may interfere with access to the proposed excavation area or with the intended excavation and backfill flow patterns.

Initial Phase

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

Follow-up Phase

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

The Project QC Manager will verify that re-vegetation or pavement activities are completed in accordance with the construction drawings, the requirements in the work plan, and the technical specifications. Deficiencies will be documented and corrected as necessary.

UST Removal Activities

Preparatory Phase

The preparatory inspection for UST removal and purging activities will include review of the construction drawings and technical specifications. Additionally, a review of the American Petroleum Institute (API) Recommended Practice 1604, *Removal and Disposal of Used Underground Petroleum Storage Tanks*, review of state regulations for UST removal and purging will also be made. Verification of the submittal approval and that appropriate, equipment, purging materials and health and safety equipment are present, and confirming that appropriate qualified field technicians are available to complete the work.

Initial Phase

Prior to the UST content removal, the Project QC Manager or Site Superintendent will complete an initial inspection of the UST to evaluate the volume of contents within the UST. The volume of the material will be calculated by stick gauging the UST and evaluating the level of material contained within the UST. Multiple inspections will likely be required during content removal. The initial inspection of UST activities will be initiated when a representative portion of the contents have been removed from the UST. The Project QC Manager will perform the inspections and note deviations from the construction drawings and specifications and any deficiencies in equipment.

The initial phase of the purging activities will be evaluation and selection of the purging material such as the inert gas carbon dioxide (either gaseous or solid form) or nitrogen. Evaluation and selection of the appropriate purging material will be made on a site-specific basis.

Prior to the UST excavation, the Project QC Manager or Site Superintendent will locate the fill pipes. Once the fill pipes are located, excavation will continue until the top of the UST has been uncovered. Once the fill pipes are located and excavation to the top of the UST is complete, purging of the tank can commence. Multiple inspections will be required during excavation and removal activities. The initial inspection of UST excavation activities will be initiated when a representative portion of the soil has been removed exposing the UST and its associated piping. The Project QC Manager will document the excavation activities and note deviations from the construction drawings and specifications and any deficiencies in equipment.

Follow-up Phase

Once the purging activities have been completed and the LEL and oxygen levels have been evaluated as safe, the UST can be removed from the ground. The metal straps securing the UST to the underground pad will be cut. Nylon strap(s) will be attached to the trackhoe bucket and the other end of the strap will be hooked to the lifting rings of the tank. The UST will be slowly lifted from the excavation and placed on an impermeable liner. The Project QC Manager or Site Superintendent will document the excavation and removal procedures.

Backfill activities of the excavation will be inspected to verify that proper placement, soil loading, and compaction methods are maintained as outlined in the technical specifications. The Project QC Manager will verify that excavation, UST removal, backfilling, and re-vegetation or pavement activities have been completed in accordance with the construction drawings and technical specifications. Deficiencies will be documented and corrected as necessary.

Once the tank is removed, the remaining sludge in the bottom of the tank will be removed using a squeegee, absorbent material, and non-sparking shovels, and placed in 55-gallon drums. The remaining sludge will not be removed until the UST is checked to verify that it is still properly purged.

The tank atmosphere will be regularly tested for flammable or combustible vapor concentrations during purging activities. The LEL and the oxygen percentage in the tank will be monitored using a combustible gas indicator. The Project QC Manager or Site Superintendent will document the results of the purging procedures.

The Project QC Manager or Site Superintendent will verify that the tank content removal and purging activities have been completed and properly documented in accordance with the technical specifications and state regulations for UST abatement. Deficiencies will be documented and corrected as necessary. The Project QC Manager or Site Superintendent will verify that the contents of the UST have been removed, the interior has been properly cleaned using a high pressure wash, and that the tank has been properly marked and secured prior to off-site transportation to a recycling facility.

Prior to any work performed on USTs, including the removal of the remaining sludge on the tank floor, the Project QC Manager or Site Health and Safety Specialist will verify that the vapor concentration is lower than ten percent of the LEL and the oxygen concentration is at least 19.5 percent.

Transportation and Treatment of Contaminated Soil and Groundwater

Preparatory Phase

The preparatory stage for transportation of contaminated soil and groundwater includes a review of the disposal, recycling or treatment facility(s) qualifications, transportation schedule for hauling material off-site, and confirming that the appropriate equipment and materials, such as hazardous or non-hazardous waste manifests, are available to complete the sampling activities.

Initial Phase

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

Follow-up Phase

Verify that the recycling or treatment facility has accepted and treated the waste material at their facility and has sent the required completed manifest to the generator or the generator's technical representative. Confirm receipt of the certificate of recycling or treatment from the designated facility and verify that the invoice is complete and accurate.

Well Installation Including Air Sparge, Groundwater Recovery, And Product Recovery Wells

Preparatory Phase

The preparatory inspection for air sparge well and/or recovery well installation activities will include review of the construction drawings, the site-specific work plan, and specifications, verifying the submittal approval, confirming qualifications and schedule of the well driller, verifying that appropriate materials are present, and confirming that the appropriate equipment and geologists and/or technicians are available to complete the work.

Initial Phase

Prior to the air sparge well and/or recovery well installation activities, the Project QC Manager will complete an initial inspection of the augers to verify that they have been properly decontaminated. The locations of the air sparge wells, groundwater recovery wells, and product recovery wells will be shown on the site plan provided in the work plan. Deficiencies will be documented and corrected as necessary.

Follow-up Phase

A geologist or other approved technical representative and the Project QC Manager will be responsible for oversight of well installation activities. Oversight activities will include verification that the work is being completed according to the technical specifications and the well details provided on the construction drawings. Attention will be placed on total well and screen depth, well materials, and filter pack materials and depths. The Project QC Manager will verify that the installation procedures are completed in accordance with the requirements provided in the work plan, technical specifications, and the well details provided on the construction drawings. Deficiencies will be documented and corrected as necessary.

Environmental Sampling

Preparatory Phase

The preparatory stage for sample collection activities includes a review of the technical specifications and sampling procedures provided in the work plan, verifying acceptance of the selected laboratory, and confirming that the appropriate equipment and materials are available to complete the sampling activities.

Initial Phase

Environmental samples will be collected and analyzed at an approved laboratory in accordance with requirements outlined in the work plan or sampling and analysis plan. Sample collection activities including proper chain-of-custody documentation will follow the protocols outlined in the work plan or sampling and analysis plan. Procedures for the collection of pre-excavation, groundwater monitoring well, treatment system, waste characterization, and confirmation samples will be outlined in the work plan.

Follow-up Phase

Sample collection locations and activities will be properly documented throughout each environmental restoration project. Analytical reports from the approved laboratory will be reviewed for accuracy and quality. If required, data validation information from the laboratory will be reviewed to verify discrepancies in the analytical data. CCI personnel will review and tabulate laboratory data and field sampling results.

Trenching Activities

Preparatory Phase

The preparatory phase for the installation of the pipe and utility trenches will include a review of the site plan, construction drawings, work plan, technical specifications, submittal status, confirmation of appropriate materials and construction equipment, worker qualifications and availability, and equipment availability.

Initial Phase

Initial inspections of the pipe trench will be completed when a representative portion of the trench has been excavated. The Project QC Manager will verify that the depth and slope are being maintained according to the construction drawings and technical specifications.

Follow-up Phase

The Project QC Manager will provide oversight during trench and piping installation activities. The Project QC Manager or Site Superintendent will document the length, depth, and location of the trench, pipe placement, and bedding and cover material in the trench. Daily observation will verify compliance with the construction drawings and technical specifications. Fill activities will be inspected to verify proper placement, soil loading, and compaction, where necessary. The Project QC Manager will conduct inspections to verify that the work, pipe materials, and associated equipment are in accordance with the construction drawings, the requirements provided in the work plan, and technical specifications. Deficiencies will be documented and corrected.

Foundation Construction

Concrete foundations will be formed and placed to facilitate construction of remediation system buildings. Free product, groundwater, and/or soil treatment equipment will be mounted at the appropriate locations on the concrete foundation inside the building.

Preparatory Phase

The preparatory phase will include a review of the construction drawings, work plan, specifications, submittal status, and confirmation of appropriate materials.

Initial Phase

Multiple inspections will be required during construction of the foundation to verify proper footing and form placement. Additional inspections will also be required to verify the proper placement of reinforcing steel or welded wire fabric that may be required. The Project QC Manager will perform the inspections and note deviations from construction drawings, specifications, and work plan and any deficiencies in equipment.

Follow-up Phase

The Project QC Manager will provide continuous oversight of the foundation placement to verify that the work is completed in accordance with the construction drawings, specifications, and requirements provided in the work plan. Compressive strength, slump, and air tests will be completed on the concrete to verify proper mix design. The Project QC Manager will evaluate the compressive strength, slump, and air test data to verify that the results are acceptable. Daily observation will verify compliance with the technical specifications and the requirements provided in this work plan. Deficiencies will be noted and corrected.

Remediation System Building Construction

The remediation system building will be constructed following construction of the foundation. Free product, groundwater, and/or soil treatment equipment will be mounted at the appropriate locations on the concrete foundation inside the building.

Preparatory Phase

The preparatory phase will include a review of the plans and specifications, review of the work plan, submittal status, confirmation of appropriate materials and equipment, worker qualifications and availability, and equipment availability.

Initial Phase

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

Follow-up Phase

The Project QC Manager will provide continuous oversight of building construction to verify that the work is completed in accordance with the construction drawings, the requirements provided in the work plan, and specifications. Daily observation will verify compliance with the construction drawings and technical specifications. Deficiencies will be noted and corrected.

Equipment Installation

Installation of free product, groundwater, and/or soil treatment equipment will include the electrical and utility connection of the required treatment equipment and associate appurtenances. Depending on the project requirements this could include vapor extraction

blower(s), moisture separator, condensation storage tank, aerator, liquid-phase carbon vessels, oil/water separator, free-product storage tank, air compressor, sump pumps, equalization tank, horizontal air compressor storage tank, pneumatic pump installation, and controls. The environmental remediation treatment equipment will be mounted at the appropriate locations on the concrete foundation inside the building.

Preparatory Phase

The preparatory phase will include a review of the construction drawings and the work plan, technical specifications, submittal status, confirmation of appropriate materials and treatment equipment, worker qualifications and availability, and equipment availability.

Initial Phase

Multiple inspections will be required during installation of the equipment. The initial inspection of the treatment equipment installation activities will be initiated following construction of the remediation building and completed when a representative portion of the equipment has been placed on the slab and connected to the proper utilities. The installation will include the plumbing and electrical connections. The Project QC Manager will perform the inspections and note deviations from the construction drawings, the work plan, and specifications and deficiencies in equipment.

Follow-up Phase

The Project QC Manager will provide continuous oversight of the treatment equipment placement, piping, and utility connection activities to verify that the work is completed in accordance with the construction drawings, work plan requirements, and technical specifications. Deficiencies will be noted and corrected.

Paving Activities

Paving will be to facilitate all weather access to the remediation system buildings, as part of the site restoration or as roadway construction. Paving activities will include grading, curb and gutter placement, as well as concrete and asphalt paving.

Preparatory Phase

The preparatory phase will include a review of the construction drawings, work plan, design drawings, specifications, submittal status, and confirmation of appropriate materials.

Initial Phase

Multiple inspections will be required during construction of the subgrade to verify proper compaction. Additional inspections will also be required to verify the proper placement of curb and gutter that may be required. Actual paving operations will require continuous inspection to assure proper pavement placement. The Project QC Manager will perform the inspections and note deviations from construction drawings, specifications, and work plans and deficiencies in equipment.

Follow-up Phase

The Project QC Manager will provide continuous oversight of paving activities to verify that the work is completed in accordance with the construction drawings, specifications, and requirements provided in the work plan. Compressive strength, slump, and air tests will be completed on the concrete to verify proper mix design. Asphalt temperatures will be verified prior to placement. The Project QC Manager will evaluate the compressive

strength, slump, and air test data to verify that the results are acceptable. Daily observation will verify compliance with the technical specifications and the requirements provided in this work plan. Deficiencies will be documented and corrective actions established.

System Start-Up and Operation and Maintenance

Each treatment system will be started, operated, and maintained for a period required in the CTO. Collection of treatment system and groundwater monitoring well samples from specified locations will be conducted as specified in the work plan. An operation and maintenance manual will be prepared that documents the required sample collection protocol, system start-up conditions, normal operating conditions, and troubleshooting guides.

Preparatory Phase

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

Initial Phase

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

Follow-up Phase

Technical personnel performing operation and maintenance activities will provide oversight of the system operation and collect any necessary treatment system and groundwater monitoring well samples from the groundwater and/or soil remediation system(s). Deficiencies will be documented and corrected. Technical personnel will abide by the operation and maintenance schedule and complete the required activities as specified in the Operation and Maintenance Manual. At the completion of operation and maintenance activities, the treatment system will be turned over to the owner for operation. An operation and maintenance manual, prepared by CCI will be provided. The Project QC Manager and technical personnel will verify that the system is operating in accordance with the technical specifications.

6.5.1.5 Project Meetings

Coordination and Mutual Understanding Meeting

Prior to the start of onsite activities, the Project QC Manager will meet with the Contracting Officer (or designated representative) to discuss the CTO QC plan. The purpose of the meeting will be to confirm a clear understanding by both the Project QC Manager and Contracting Officer exists regarding the specific QC points of concern on the features of work, forms to be used on the project and the correct protocol for use of each form, administration of both onsite and offsite work, and the duties and responsibilities of all CCI personnel on the site. The meeting will be attended by the CTO Project Manager, Site Superintendent, and Project QC Manager.

QC Meeting

After the start of site work activities, the Project QC Manager will conduct QC meetings at a frequency established as necessary by the pace of the work, or as required by the

Contracting Officer. Typically, meetings are expected to occur at two-week intervals. Conducting the meetings and preparing the meeting minutes are responsibilities of the Project QC Manager. The daily contractor quality control report will also document the meeting occurrence. The meeting agenda will include:

- Review of previous meeting minutes
- Review of the project schedule
 - Work or testing accomplished since the last meeting
 - Rework items identified since the last meeting
 - Rework items completed since the last meeting
- Submittal status
 - Submittals reviewed since the last meeting
 - Submittals expected within the next 2-week window
- Review of the work scheduled over the next 2-week window
 - Establish completion targets for any outstanding rework
 - Identify and schedule any definable features of work requiring preparatory phase activities
 - Identify and schedule any definable features of work requiring initial phase activities
 - Identify and schedule any definable features of work requiring follow-up phase activities,
 - Identify any testing required in support of or confirming remedial activities
 - Review status of any offsite activities
 - Identify any special documentation requirements for either production or QC
 - Address and resolve any production or QC problems
- Identify any activities or items that may require revising the CTO QC plan, and annotate any recommendations
- Identify any production or QC procedures that may be less effective than anticipated and may require revising the project delivery or QCPP, and annotate any recommendations

6.5.1.6 Reporting

Contractor Production Reports

The Contractor Production Report documents the daily construction activity at the project site. One is to be prepared for each CTO in progress. The document is prepared, signed, and dated by the Site Superintendent. The Site Superintendent will submit the report to the Project QC Manager for attachment to the Daily Contractor Quality Control Report. A sample form is provided in Appendix D.

Daily Contractor Quality Control Reports

The Daily Contractor Quality Control Report documents the quality control activity at the project site. A report will be prepared for each CTO in progress. The document is prepared, signed, and dated by the Project QC Manager. The Project QC Manager will submit the

report to the Contracting Officer, with the Contractor Production Report attached, the day following the date of the report. A sample form is provided in Appendix D.

Testing Plan and Log

The Testing Plan and Log is a document that defines and records the parameters associated with all onsite testing that occurs over the course of the CTO. This document will be maintained by the Project QC Manager as tests are conducted and test results reported. Data is to be entered at the time of the testing and immediately upon receipt of the test results. The Testing Plan and Log will be submitted monthly for Contracting Officer review. A copy of the log is provided in Appendix D.

Monthly Summary Report of Field Tests

The Project QC Manager will complete a report at the end of each month's activities. This report will provide a monthly summary of all testing activities conducted over the reporting period and their corresponding results (pass/fail). The report will be attached to the last Daily Contractor Quality Control Report submitted for the reporting period. A copy of the report is provided in Appendix D.

QC Meeting Minutes

On the event of a CTO QC meeting, the Project QC Manager will take minutes and release the documented proceedings within two calendar days of the meeting. A copy of the meeting minutes form is provided in Appendix D.

Rework Items List

The Rework Items List is a list maintained by the Project QC Manager to document those discrepancies that are not corrected within the same day of discovery. Should a non-compliant activity or result be observed during a work period and be corrected within the same work period, it does not need to be recorded on the Rework Items List. The list will include items identified by both the Contractor and the Contracting Officer. A copy of the updated list will be attached to last Daily Contractor Quality Control Report submitted for the reporting period (month). An example is provided in Appendix D.

Nonconformance Notice

An NCN is issued by the Project QC Manager to the subcontractor for subcontract non-conforming on-going work or work in place. Upon discovering nonconforming or unacceptable work, the Project QC Manager will immediately notify the subcontractor. If the work cannot easily be corrected (i.e., within the current workday), the Project QC Manager will then issue an NCN, which will be copied to the PM, Contract Administration Manager (CAM), and QCM. The subcontractor must respond with proposed corrective action within 24 hours. The Project QC Manager and PM will review the proposed corrective action and respond to the subcontractor. The Project QC Manager will document the actual corrective action taken and inform the PM, CAM, and QCM.

A copy of the NCN form is provided in Appendix D.

Sampling and Analysis Plan

When environmental sampling is required under performance of any CTO, a Sampling and Analysis Plan will be prepared and maintained. The Project QC Manager will monitor the plan for compliance with regards to sample collection and submission procedures.

Submittal Register

Refer to the Submittals section of this plan for specific direction regarding submittal processing and register maintenance.

As-Built Records

The Project QC Manager and Site Superintendent will be jointly responsible for maintaining as-built records. Verification that data, information, records, etc., have been incorporated into the project files will be the sole responsibility of the Project QC Manager.

As-built records will be maintained at the project site and will be available for inspection by the Contracting Officer at any time.

6.5.1.7 Surveying

Under the provisions of the Contract Documents, all lines and grades are to be established by CCI from existing baselines or benchmarks. CCI is charged with the responsibility of maintaining stakes, marks, or information establishing lines and grades. The Site Superintendent is responsible for verifying conformance of final lines and grades with the Contract Documents, and coordinating confirmation with the Project QC Manager. Should the Site Superintendent and/or Project QC Manager need assistance in confirming that the work is within acceptable tolerances and is properly located/oriented, they should advise the Resident Engineer and QCM of their concern. The Resident Engineer will review the specific situation with the Site Superintendent, and if necessary, will arrange for survey services to be provided to address the concern and confirm the nature and/or quality of the work. Once a clear conclusion has been established, the Project QC Manager will respond accordingly that the work is acceptable, or with an advisory to the Site Superintendent via a non-compliance notice addressing the construction concern.

All survey data must conform to the Tri-Service Spatial Data Standards (TSSDS). These standards will be applied on all deliverables involving site investigation, site assessment, site verification, remedial investigation, and confirmation sampling activities. Horizontal controls for graphic and non-graphic information are Mercator Projection, GRS 80, State Plane Coordinate System, North American Datum 1983, Lambert Zones 1 through 6 (or appropriate zone for region to be mapped), feet. Vertical controls are Mean Sea Level, North American Vertical Datum 1988.

6.5.1.8 Materials Testing

Materials testing to be performed during project construction will be contracted for by the Subcontract Administrator in concert with the PM and QCM. Scheduling of site services will be the responsibility of the Project QC Manager. Materials testing may include, but not be limited to the following:

- Performance of gradation analysis on fill materials
- Perform laboratory Proctor compaction tests
- Perform relative density testing, moisture (critical for modified proctor)
- Perform pavement analyses, asphaltic concrete
- Molding, curing, and breaking of concrete cylinder specimens
- Slump test for cast-in-place concrete
- Checking air entrainment for cast-in-place concrete
- Checking and recording concrete temperature for cast-in-place concrete

- Sample testing of mortar and grout
- Subgrade evaluation (bearing capacity/penetrometer)
- Asphalt cores, Marshall samples, gradation, density, etc.
- Other tests and/or samples specific to the general services agreement

Results of the above testing will be reported to the QCM.

The Subcontract Administrator is also responsible for administering the materials testing contract(s). This activity will be done in close coordination with the QCM as well as the Project QC Manager. Confirmation of laboratory invoices will be the responsibility of the Project QC Manager. Maintenance of site testing records will also be the responsibility of the Project QC Manager.

One provision of the contract is that the Project QC Manager will make arrangements with the laboratory to take samples and specimens at least 24 hours in advance. A record of the laboratory's work will be recorded by each Project QC Manager in the daily Contractor Quality Control Report and in the materials testing log kept as part of the project files for verification purposes. Typical information kept in the daily Contractor Quality Control Report includes time on the project, name of technician, and tests or samples taken (with locations). The testing lab technician will provide an immediate copy of the field activity report to the Project QC Manager prior to their departure. This report summarizes activities conducted and allows the inspector to verify that correct information and locations have been recorded.

6.5.1.9 Periodic Site Visits/Observation

Based on the project's need for services by specialized technical staff, the QC representative will secure permission from the PM, coordinate with the QCM, and subsequently arrange visits to the site in the following disciplines:

- Geotechnical Engineer
- Construction Engineer
- Civil Engineer
- Project Chemist
- Hazardous Waste Engineer
- Environmental Scientist
- Project Controls Specialist
- Others as required

The purpose of the site visits is to provide one or more of the following:

- Technical review of and assistance with ongoing construction
- Observation/evaluation of field performance tests
- Assistance in problem resolution
- Assistance in final inspection/project closeout
- Others as required

Each individual visiting the site will meet initially with the CTO Inspector and Site Superintendent to review procedures and goals of the visit. The individual visiting the site will prepare a report for each visit detailing activities, observations, requested actions,

proposed solutions, etc. Before leaving the site, the visitor will debrief with the CTO Project QC Manager and Site Superintendent.

6.5.1.10 ROICC Inspections

Periodically, the ROICC inspector assigned to the project will visit the project and review the work to check for contract compliance. These may or may not be scheduled or coordinated visits, but are likely to be periodic. The inspector will typically arrive onsite to observe and evaluate project activities. In all cases, the onsite QC representative will accompany the inspector. In cases where the assigned QC representative is a part-time assignment, if the representative is not present at the time of the visit, the Site Superintendent will accompany the inspector on the site visit.

6.5.1.11 Punch Lists

The inspection staff will maintain a continuous list of deficient items for each CTO, organized by definable feature of work within the respective CTO. Upon receipt of notification from the Site Superintendent signifying substantial completion, the Project QC Manager will execute a thorough assessment of the work in place with the Site Superintendent in order to generate a punch list. The Project QC Manager will arrange for specialty inspections, as necessary. The punch list will consist of an accumulation of items from:

- Contractor Production Reports
- Rework Items List
- Review of specifications, submittals, and drawings
- Contracting Officer observations and comments
- Specialty inspection reports

The Project QC Manager will prepare a draft copy of the punch list for review by the Site Superintendent, PM, and QCM. Upon approval and direction from the PM, the Site Superintendent will use the list to establish a completion schedule and target final inspection by the Contracting Officer. During the final inspection with the Contracting Officer or his representative, a final punch list will be developed and a punch list schedule will be established.

Upon notification by the Site Superintendent that specific work items have been completed, the Project QC Manager will examine the completed work with the Site Superintendent. Should the item be correctly completed, the Project QC Manager will initial and date the item on the confirmation copy of the punch list and notify the ROICC for verification. The official confirmation copy of the punch list will be maintained in the project files. Items disputed by the Site Superintendent will be noted to the QCM, who will review them with the Project QC Manager and Site Superintendent, and if necessary, the PM. Updated punch lists will be issued weekly to the Site Superintendent, PM and QCM.

Due to the nature of the work and the maintenance of the rework items list, punch lists are to be very specific and brief. This will reduce the magnitude of an overall final inspection and will, in turn, facilitate substantial and final completion.

6.5.1.12 Laboratories

Acquisition of laboratory services will be necessary under most CTO-specific projects. In accordance with the requirements of the CCI Southern Division RAC, laboratory services will be obtained from independent testing laboratories qualified to perform the testing required by CTO projects. Two different types of laboratory services are anticipated: construction-related analyses and environmental analyses. The CTO QC Plan Addendum will specify the types of sampling and analysis required for the project and identify the type of laboratory service required.

Once the type of laboratory service required has been determined, the selection process will be conducted using, at a minimum, a demonstration by the laboratory that it is capable of meeting the relevant accreditation/certification criteria to complete the work in a manner which is both reliable and adequately documented to meet the following six indicators of data quality:

- Comparability
- Completeness
- Representativeness
- Accuracy
- Precision
- Acceptable detection limits (environmental media, only)

Laboratories must be actively participating in relevant accreditation/certification programs. The CTO QC Plan Addendum will specify the types of accreditation/certification which are relevant to each CTO-specific project. Some examples include the following:

- Construction-Related Activities
 - National Institute of Standards and Technology (NIST)
 - National Voluntary Laboratory Accreditation Program (NVLAP)
 - American Association of State Highway and Transportation Officials (AASHTO) Program
 - American Association for Laboratory Accreditation (AALA) Program
- Environmental Investigations
 - Navy Laboratory Evaluation Program
 - EPA Contract Laboratories Performance (CLP) Program
 - Individual Certification/Accreditation programs or criteria

The CTO QC Plan Addendum will also specify data deliverable formats, both electronic and hard copy, data quality objectives, laboratory deliverable schedules, and performance criteria.

6.5.1.13 Documents, Reports, Minutes, Correspondence

Documents, reports, minutes, and correspondence are deliverables provided to the Navy. Quality in these deliverables is based on both technical and non-technical aspects of the work. To have acceptable quality, deliverables must meet at least the following requirements:

- Logical and technically correct assumptions, approach, and conclusions

- Appearance and format meeting firm and client style standards (e.g., cover, printing, figures, and tables)
- Logical organization and presentation
- Readable properly edited text (i.e., no typographical errors, misspelled words, or incorrect references)

Internal reviews, as well as client comments or feedback, and their resolution will be documented and maintained as permanent project records.

6.5.2 QC Documentation

6.5.2.1 Contractor Production Reports

The Site Superintendent will document site construction activities using the electronic Contractor Production Report, which is a template within the Microsoft Word application. Reports are required for each day that work occurs at the CTO site. Every calendar day of the CTO is to be accounted for with a report, even if no activity occurs. An example is included in Appendix D. The following guidelines are to be followed:

- Each Site Superintendent will prepare and submit the reports to the Project QC Manager within the next working day of the report.
- The Site Superintendent will assure report filenames are in accordance with document control protocols for standardization (refer to Section 3.7 of the CMP for specific guidance). The Site Superintendent will also verify the report has been electronically submitted to the PMO in the correct file location.
- Entries are to be accurately and thoroughly made, addressing factual information only and avoiding opinion, conjecture or speculation.
- Report every workday and account for every calendar date. If no work is done on a given date, the date should be entered and the reason for not working should be recorded (i.e.; "No activities scheduled for this date, no onsite inspection services provided"). Should seven consecutive days of inactivity occur, a single report accounting for each day will be prepared on the last day of the seven day sequence.
- Document site activities. References to specific schedule activities will be made regarding definable features of work. Problems or abnormal occurrences will be clearly described, including the reason for the specific occurrences. Entries should include, but are certainly not limited to:
 - Date of the report, report number, contract number, title and location of CTO, and the name of the reporting Site Superintendent
 - Weather conditions in the morning and afternoon, typically 8:00 a.m. and 2:00 p.m.
 - Report the number of construction employees on the CTO site, sorted by employer. Annotate trade, work location, and description of work performed
 - Report job safety actions taken and safety inspections conducted. Specifically annotate if:

- A job safety meeting was held (if so, attach a copy of the meeting minutes)
- A lost time accident occurred (if so, attach a copy of the completed Occupational Safety and Health Administration (OSHA) report)
- Trenching, scaffold, high-voltage electrical, or high work was done (if so, attach inspection checklist used for corresponding aspect of work)
- Hazardous material or waste was released into the environment (if so, attach a description of the event and proposed corrective action)
- List of equipment and/or material received that is to be incorporated into the job
- List of construction and plant equipment onsite, indicate number of hours in use, hours idle, and/or hours down for repair
- Identification of any delays that occurred over the course of the day and the corresponding cause. Cite if delay is recoverable and how recovery will be executed
- Identification of any and all changes that occurred over the course of the day and how the change was precipitated
- Site visitors log

6.5.2.2 Daily Contractor Quality Control Reports

The Project QC Manager will document site activities using the electronic Daily Contractor Quality Control Report, which is a template within the Microsoft Word application. Reports are required for each day that work occurs at the CTO site. Every calendar day of the CTO is to be accounted for with a report, even if no activity occurs. An example is included in Appendix D. These guidelines are to be followed:

- Each Project QC Manager will prepare and submit the reports within the next working day of the report. Ensure that the Contractor Production Report is attached to the Daily QC report.
- The Project QC Manager will ensure that report filenames are in accordance with document control protocols for standardization. The Project QC Manager will also ensure that the report has been electronically submitted to the PMO in the correct file location.
- Entries are to be accurately and thoroughly made, addressing factual information only and avoiding opinion, conjecture, or speculation.
- Report every workday and account for every calendar date. If no work is done on a given date, the date should be entered and the reason for not working should be recorded (i.e., "No activities scheduled for this date, no onsite inspection services provided."). Should seven consecutive days of inactivity occur, a single report accounting for each day will be prepared on the last day of the seven day sequence.

- Include references to phone calls and onsite conversations. Record details of pertinent and relevant conversations on the standard telephone conversation form and reference the conversation record in the daily QC report.
- Document site activities. References to specific schedule activities will be made regarding definable features of work. Each Project QC Manager is responsible for coordinating activities with the Site Superintendent and ensuring knowledge of planned construction activities. Problems or abnormal occurrences will be clearly described, and incorporated into the rework item list as required, including the reason for the specific occurrences. Entries will include, but are certainly not limited to:
 - Identify the control phase and the definable feature of work.
 - Annotate results of any preparatory phase meetings and/or activities.
 - Annotate results of any initial phase meetings and/or activities.
 - Annotate results of any follow-up phase inspections and/or activities.
 - Report the number of construction employees on the CTO site, split among trades. Note CCI staff and individual subcontractors. This information should be obtained from the Site Superintendent, not by personnel count, although the information should be corroborated by visual count.
 - Report the work performed and reference scheduled activities, using common terminology, whenever possible.
 - Report tests conducted and corresponding results.
 - Report testing services utilized. If subcontracted, include the number of technicians, number of tests, and time spent on the project.
- When a specific scheduled activity or measured event is completed (e.g., a portion of a basin slab is cast, a length of pipeline is laid, a specific piece of equipment is set), clearly annotate so in the daily QC report and record the date on the as-built drawings.
- In the event paperwork is exchanged with the Contracting Officer, record the time, the name of Contracting Officer's representative to whom field paperwork was delivered or received, and the nature of the contents of the paperwork.
- Note questions on workmanship, to whom the question was raised, and what the disposition of the question was/is.
- In the event multiple CTOs are being overseen by one Project QC Manager, each CTO will be reported independently.
- Document photographs taken and any unusual activities observed.
- Update the rework item list as activities are completed.
- Ensure that proper documentation is prepared and filed for Technical Specialist site visits in compliance with QCPP and this CTO QC Plan protocols.
- Ensure the certification is completed and signed.

- File field pocket notebooks (Rite in the Rain) in the permanent project records.

6.5.2.3 Testing Plan and Log

The testing plan and log is intended to identify and track the status of those tests, both construction and environmental, required by the contract (CTO). The log will be developed by the QC administrator and PM, and maintained at the site by the Project QC Manager. An example of the log format is provided in Appendix D. The specific items recorded in the log are self explanatory. One key purpose of the log is to alert the Project QC Manager and Site Superintendent to the required tests, which in turn allows them to ensure proper protocols are incorporated into the project activities, QC plan, health and safety plan, and schedule. The log also serves as a basis to confirm availability of testing services prior to the onset of site activities.

In that the plan and log is in electronic format, the Project QC Manager is responsible for ensuring the current version is properly filed within the PMO electronic file. Updates will be monitored by the QC administrator to ensure current status is available to program management and project management staff.

6.5.2.4 Monthly Summary Report of Field Tests

The monthly summary of field tests is exactly that, a synopsis of tests conducted over the reporting period and the corresponding results (pass or fail). The summary sheet will be submitted as a cover sheet to the monthly submission of the updated sampling plan and log. Format for the report is provided in Appendix D. The specific items recorded in the log are self-explanatory.

In that the plan and log is in electronic format, the Project QC Manager is responsible for ensuring the current version is properly filed within the PMO electronic file. Updates will be monitored by the QC administrator to ensure current status is available to program management and project management staff.

6.5.2.5 QC Meeting Minutes

The critical concerns regarding QC meeting minutes are the timeliness of their issuance, the accuracy of the comments, and the thoroughness of the recorded proceedings. The Project QC Manager will use the standard CCI Word template for meeting minutes, an example of which is included in Appendix D. Given the timing of submission of the minutes (no more than two calendar days following the meeting), the Project QC Manager will review the minutes with the Site Superintendent to confirm thoroughness and quality of the content the day following the meeting. If there are areas of concern regarding quality of the delivered work product or procedures in use at or off the site, the Project QC Manager and Site Superintendent will contact the QCM and PM for a briefing and review of the minutes prior to their issuance. Should the Contracting Officer's representative have questions or comments on the minutes, the Project QC Manager and Site Superintendent will respond to such via amended minutes or separate correspondence. In such an event, issuance of the response will be preceded by a review of the response by both QCM and PM.

In that the meeting minutes will be in an electronic format, the Project QC Manager is responsible for ensuring the document is properly filed within the PMO electronic file.

6.5.2.6 Rework Items List

The rework items list is intended to identify and status the items of work within the contract (CTO) that have been identified as not satisfying contract requirements. The list will be developed and maintained at the site by the Project QC Manager. An example of the list format is provided in Appendix D. The specific items recorded in the list are self-explanatory. Critical to understanding the list is recognizing that items are entered into the list only if corrective action of a deficiency cannot be completed within the workday it was identified. One key purpose of the list is to provide a tracking mechanism for the Project QC Manager and Site Superintendent for discrepancies, required corrective action, the respective priority of resolution, and confirmation of resolution. The list in turn allows them to ensure PM and QCM awareness to site issues and potential lessons learned which could support future CTO project activities, QC plans, health and safety plans, and schedules.

Since the list is in electronic format, the Project QC Manager is responsible for ensuring the current version is properly filed within the PMO electronic file. Updates will be monitored by the QC administrator to ensure current status is available to program management and project management staff.

6.5.2.7 Submittal Register

Refer to the Submittals section of this plan for specific direction regarding submittal processing and register maintenance.

6.5.2.8 Photographs

The onsite Project QC Manager will maintain the construction photograph file. Photographs will be taken as required and periodically by the Project QC Manager or designee. Standard progress, details of work, unusual occurrences, accidents, details of problems (poor work, non-complying work) and displays of good, quality work and craftsmanship are examples of photographs that are to be taken by each Project QC Manager or designee. Photographs will be filed in 3-inch three ring binders and arranged chronologically, two photos per page. Each photograph will be labeled directly on the photo.

Photographs will also be provided on CD for the permanent project record. Negatives and the CD will be filed at the Program Management Office. Additionally, one set of prints will be maintained in the field office.

Vantage points for progress photos are to be consistent from set to set. If the location is not apparent, the viewer's location should be defined. Care should be taken to ensure scale definition is evident so viewer can gauge size, depth, etc. Photographs are to be taken with a data-back camera with the date displayed (time will only be displayed in necessary situations).

Progress photograph protocol is as follows:

- Four-inch by six-inch photographs will be used.
- The Project QC Manager/photographer will document pertinent information to be typed onto adhesive-backed labels. Labels will be adhered to the backs of the photographs after typing. Information will include the perspective of the view, the project name and contract number, name of Project QC Manager, time of photo, and a

brief description of the view. If hand written in lieu of typed, all writing will be block printing - clear and very legible. If the date is not clearly visible via the data-back label on the print, the date will be written in as information with the description.

- Two prints will be processed of each photograph, and labeled and filed. The film processor will provide, in addition to the two sets of prints, one set of negatives which will be used to generate the CD stored set. One set of prints and the CD should be kept secure (i.e., fireproof) and separate from the set of negatives at the PMO.
- Negatives will be filed promptly in sleeves. The sleeve containing the negatives will be labeled citing the project and dates covered by the negatives. The negative sleeve will then be forwarded to the PMO for retention.

6.5.3 Work Processes

Activities and processes affecting the quality of items and services conducted under the CCI Southern Division RAC Program, including CTO projects, are prescribed by and performed in accordance with documented instructions, procedures, drawings, and specifications associated with contract CTOs issued by the Southern Division. To the greatest extent practical, established, approved procedures will be used in execution of the work. The objective is to ensure efficiency, cost-effectiveness, coordination among study, design and construction objectives, reliability of data collected, safety and proper recording and reporting formats. In the event a modification to an approved procedure or development of a new procedure is required by virtue of delivery requirements or implementation of an innovative delivery approach, review and approval of the proposed procedure (revised or new) by appropriate technical specialists and management must be completed before implementation. Development of standard operating procedures (SOPs) for appropriate repetitive processes is encouraged. SOPs developed for specific CTOs will be standardized via incorporation into the CMP. SOPs are made accessible to all CCI Southern Division RAC staff through the CMP.

6.5.3.1 Field Investigations

Field investigations and investigation processes will be planned to meet DQOs. The specific scope and procedures required by specific CTOs will be identified and documented in respective project work plans. The practices, techniques, and equipment for data collection and sampling will be reviewed periodically (at the time of preparation of a CTO, or no more than at six-month intervals) for technical soundness and validity. Project-specific procedures will be reviewed and approved by the PM.

Activities are to be identified such that investigations are performed in accordance with established CCI procedures. The CTO specific procedures provide details of:

- Instrumentation
- Calibration, maintenance, and repair
- Decontamination and waste management
- Methods
- Records

When a technical activity requires a deviation from a procedure, specification, or drawing, the Project QC Manager must approve such deviation and document the occurrence accordingly. If the deviation is such that the Project QC Manager must obtain approval from higher authority, the Project QC Manager will document the deviation, forward the request for approval of the deviation to the PM and QCM, and follow-up daily with the QCM until disposition is provided. Data rendered questionable by deviations from procedures will be annotated accordingly in the testing plan and log.

6.5.3.2 Data Management

Data Collection and Analysis

Data collection and analysis will be performed in accordance with project plans and procedures. Documentation will be sufficiently detailed to ensure that data collection is consistent and reproducible. For laboratory or other analytical data, quality control checks are performed using accepted methods such as blank, replicate, duplicate, spiked, and split samples. Data collection instructions are reviewed and approved.

Field logbooks are maintained to record samples collected, data measurements taken, and observations of events and conditions that could affect data quality. Original data collected in the field and field logbooks will be retained as permanent quality records. The field logbooks will be used by the Project QC Manager to transcribe appropriate information into the testing plan and log. Original data may also be recorded and backed up on electronic media (e.g., tape or disk).

Data Tracing and Identification

Data recorded in field logbooks will be done in adequate detail so data may be traced to the project and specific location from which the data was obtained. The date and time of data acquisition will be recorded. Type and serial number of all instruments used to obtain the data, and the names of sampling team members will also be recorded.

Data Transfer and Reduction

When data are transferred from one medium to another, the transfer method is verified to be error free (or within a specified tolerance). Data transfer includes, but is not limited to transfer from:

- Field logbooks into testing plan and log
- Field logbooks or testing plans and logs into a computerized database
- Automatic data acquisition device outputs (e.g., strip chart recordings) to manually generated tables or computer databases
- Computer outputs to other computer inputs (e.g., magnetic tape to disk)

PMs are responsible for appropriately documenting and checking data reduction calculations. Data reduction calculations and associated checking are maintained as project records. Data validation is conducted in accordance with Section 3.0 of the CCI Quality Management Manual.

6.5.3.3 Sampling

Sampling and analysis procedures are prepared based on standard protocols established by CCI and include sampling techniques, frequency, and associated equipment. The following topics are included in sampling and analysis procedures:

- Required equipment
- Collection methods
- Special conditions for sample preparation to avoid contamination
- Decontamination and cleaning procedures
- Types and volumes of sample containers
- Holding times
- Preservation methods
- Sample shipment and chain-of-custody procedures
- Sample analysis methods

A CTO project-specific Sampling and Analysis Plan will be prepared as a component of the CTO work plan when applicable. The SAP identifies the number and types of samples to be collected, sampling locations, analytical parameters, health and safety requirements, and unusual conditions. DQO planning will be implemented in accordance with EPA 540/G-87-003 and 004 or as required by the CTO.

6.5.3.4 Test Control

Site investigation field-testing will be performed in accordance with the CTO project work plan. The CTO QC Plan Addendum will include provisions to assure that all data collected is of known quality and meet project requirements. The PM and QCM will review this section of the CTO QC Plan Addendum.

Tests may be needed to verify conformance of an item to specified requirements and to demonstrate that the item will perform satisfactorily in service. Tests may also be required to verify techniques for waste minimization or disposal. Such tests will be planned and executed in accordance with the requirements and acceptance criteria of applicable design or other pertinent technical documents.

6.5.3.5 Control of Measuring and Test Equipment

Measuring and test equipment must be the proper type, range, accuracy, and tolerance to determine conformance to specified requirements. Project records will identify the measuring and test equipment used for an activity.

For each major piece of equipment, calibration frequency and standards are specified in appropriate CCI procedures. Normally, manufacturer's instructions are followed for calibration, calibration checks, and maintenance. The method and interval of calibration for each item is based on the type of equipment, stability characteristics, required accuracy, intended use, and other conditions affecting measurement control.

When measuring and test equipment is found to be out of calibration, an evaluation of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested will be conducted and documented. Out-of-calibration devices are tagged or segregated and not used until they have been re-calibrated. If an item of

measuring or test equipment is consistently found to be out of calibration, it will be repaired or replaced. Re-calibration will be performed whenever the accuracy of the equipment is suspect.

Reference calibration standards used are certified as traceable to National Institute of Standards and Testing (NIST) or other acceptable standards. Appropriate documentation is maintained to substantiate the validity of the standards used.

The PM is responsible for the control and calibration of tools, gauges, instruments, and other devices used for acceptance inspections and tests during site field activities. The Project Manager is also responsible for using appropriately calibrated and checked instruments during investigations and maintaining records to indicate calibration status. The Project QC Manager is responsible for assuring that the appropriate equipment is used for inspections and tests.

6.5.3.6 Handling, Shipping, and Storage

When site activities require temporary or permanent installation of equipment, facilities, or structures, the PM is responsible for verifying that necessary special handling, cleaning, and storage requirements have been specified. Such requirements are identified and made available to field personnel through appropriate documents such as manufacturer's instructions, manuals, or field procedures.

Special tools and equipment are used and controlled as necessary for safe and adequate handling. Special handling tools and equipment are inspected and tested in accordance with applicable standards or procedures and at specified time intervals to verify that they are adequately maintained. Operators of special handling and lifting equipment are experienced or trained in using the equipment.

Sample shipment will be performed in accordance with requirements of the Department of Transportation (DOT). Sample chain-of-custody procedures provide for sample labeling and tracking reports, which contain the following information:

- Unique sample identification
- Analysis(es) to be performed
- Documentation of specific reagents or supplies that become an integral part of the sample (preservatives, absorbing reagents, filters, etc.)
- Sample preservation method
- Sample chain-of-custody logs
- Identification of personnel

Procurement documents require laboratories to document and maintain appropriate chain-of-custody procedures.

6.5.3.7 Inspection, Test, and Operating Status

The status of permanently installed equipment is identified by tagging or by documentation traceable to the equipment. Documentation includes the status of component installation,

component installation testing, system functional testing, system or component turnover, and any deficiencies associated with the component or system.

When dynamic, operating, electrical, or other type equipment must be isolated or removed from service because of safety or environmental concerns, it is to be tagged and appropriate lockout procedures implemented. Tagging and lockout requirements will be developed on a CTO specific basis to conform to facility, base, station, or process requirements. At a minimum, CCI standards defined in the Health and Safety procedures are to be observed when locking out and/or tagging out a piece of equipment.

6.5.4 Submittals

Submittals are a major performance element within the CCI Southern Division RAC. The effectiveness with which we manage the submittal process will be an influential parameter in the determination of how effective CCI has been in executing and delivering CTO work assignments. As such, the QCPP is dedicated to process definition and delineation of responsibilities within this area of performance and is available to CTO staff.

The QCPP addresses the general standards associated with submittal processing. These include, but are not necessarily limited to, defining types of submittals involved with execution of the CCI Southern Division RAC, use of the submittal register, procedures for processing submittals, and the formats associated with the various types of submittals.

6.5.4.1 Submittal Types

Pre-Construction submittals typically include:

- Project Delivery Plans
- Quality Control Plans
- Site Health and Safety Plans
- Vendor Design Calculations, Shop Drawings, etc.
- Personnel Qualifications (Welding, NDE, etc.)
- Product Data
- Samples

Construction/Post Construction submittals typically include:

- Production, Inspection, and Test Reports
- Material Certifications
- Progress Reports, Safety Reports, Manpower Reports, etc.
- As-Built or Certified Data
- Operation and Maintenance Manuals
- QC Records and Certifications

6.5.4.2 Submittal Register

At the onset of each CTO the Contracting Officer will provide to CCI the submittal register with specific review items identified and corresponding review authority. The form cited in the contract documents contains 15 columns and the process for using the register is clearly described in Part 7.8 of the contract. Recognizing the charter to move to an electronic process in the near future, identified herein is a slight revision to the register protocol,

which involves the application of *Excel* (spreadsheet application) as the register platform in a standard format. This approach, described in the ensuing outline, involves a single register as opposed to multiple copies maintained by the separate entities to the contract. Employing an electronic version of the register may be of benefit to the program, and CCI will be responsible for its currency, accuracy, and maintenance. In either case, CCI will follow the direction of the Contracting Officer. Similarly, in either case, the Contracting Officer provides the initial data for columns A through E of the register. An example of the printed form is included as Appendix D.

- Column A will identify the specification section requiring the submittal.
- Column B will be a submittal description (refer to part 7.7 of the contract for the schedule of submittal descriptions), including a list of materials or products addressed by the submittal.
- Column C identifies the principal paragraph in the specification section where the material or product is specified.
- Column D is used to cite the approving authority ("G" indicates Contracting Officer approval; blank indicates QCM approval).
- Column E is used in cases when the Contracting Officer will cite reviewers other than the QC organization (space may be blank).
- Column F identifies the submittal number, in consecutive format, assigned by CCI. Resubmittals will require addition of a suffix to the original submittal number. For example, the first resubmission of original submittal 16 could be labeled 16A. The second 16B, and so forth.
- Column G identifies the expected date the approving authority should receive the submittal.
- Columns H and I will document CCI PM review of the submittal prior to transmitting it to approving authority.
- Column J cites the date CCI transmittal of the submittal to the QC organization
- Column K entry will be that date the submittal is received by the QC organization.
- Column L entry is the QC disposition of the submittal. In cases where the Contracting Officer is the approving authority, the disposition must be no less than "Approved as Noted" before forwarding to Contracting Officer for review.
- Column M entry will be that date the submittal is transmitted by the QC organization to either the Contracting Officer as approving authority, or back to the subcontractor for further action (e.g., purchase, installation, revisions, etc.).
- Column N entry will be that date the submittal is received by the Contracting Officer.
- Column O entry is the QC disposition of the submittal

- Column P entry will be that date the submittal is transmitted by the Contracting Officer back to the QC organization within CCI for further action (e.g., purchase, installation, revisions, etc.).
- Column Q used for any remarks that annotate special concerns or situations with the submittal (e.g., expedite, administrative only).

6.5.4.3 Technical Submittal Process

Specific details regarding transmittal requirements, numbers of copies, certification statements, submittal disposition, and reviewing authority are addressed in Part 7.0 of the Contract. Several forms (e.g., transmittal form) and procedures will be identified and incorporated into the plan upon definition of those requirements by the Contracting Officer.

Submittals will be received by the Resident Engineer who will log them directly into the Submittal log. After logging, the submittal will be forwarded to the PM, with a copy filed and the submittal entered onto a tickler tracking list. Permanent project filing will be by CTO, and very simply by submittal number. The document control number (DCN) generated will identify where the submittal is filed, which will be the corresponding submittal number. Should resubmittals be required under any submittal, the DCN will have a corresponding suffix appended to the initial submittal number (e.g., the second resubmittal for submittal 23 will be annotated "23B"). The Resident Engineer will status the submittal in the submittal register at each step of the process.

Once received, the PM will review the submittal for general contract conformity and determine its worthiness to proceed through the review process. If ...

- ...in the opinion of the PM the submittal is in general conformity with the contract, the submittal will be forwarded to the Project QC Manager for review.
- ...in the opinion of the PM the submittal does not conform to the contract documents, the submittal will be returned to the Subcontractor or vendor/supplier annotated with the disposition "*Not Reviewed.*"

The Project QC Manager will review the submittal to confirm the conclusion and disposition recommended by the PM. If...

- ...in the opinion of the Project QC Manager the submittal is in general conformity with the contract, the submittal will be forwarded to the QCM for review.
- ...in the opinion of the Project QC Manager the submittal does not conform to the contract documents, the submittal will be returned to the Subcontractor or vendor/supplier annotated with the disposition "*Not Reviewed*" and a brief explanation of the deficiencies.

If the QCM is the approving authority for the submittal, the QCM will establish the disposition accordingly, and if...

- ...after technical review there are no comments, the submittal will be returned to the Subcontractor or vendor/supplier with the disposition "*Approved,*" which will permit

the Subcontractor to release the product for delivery, install the product (or store it) and bill for the product and its installation. Subcontract specifications will typically allow 45 calendar days of review time, inclusive of CCI and Contracting Officer time. The review time will be as follows: Log-in - 1 day; PM review – 2 days; forward to Project QC Manager - 2 days; Project QC Manager review – as approving authority, 15 days / as QC confirmation of PM disposition, 2 days; forward to Contracting Officer, 1 day; Contracting Officer review, 20 days; and return to Subcontractor/Vendor – 2 to 5 days, dependent upon Contracting Officer disposition.

- ...after technical review there are minor comments, such as those that alert the Subcontractor to special coordination needs among other products or for those that change or correct the submittal data in an insignificant manner, the submittal will be returned to the Contractor with the disposition "*Approval as Noted*", which will permit the Contractor to proceed as indicated under the "*Approved*" disposition, but only after consideration and incorporation of the review comments.
- ...after technical review there are comments significant enough to require a resubmittal, the submittal will be returned to the Subcontractor with the disposition "*Revise and Resubmit.*" The Subcontractor should not order, deliver or install any product or material item without special permission from the Project QC Manager when the corresponding submittal has an "*R&R*" status. The Subcontractor must resubmit the submittal. The Resident Engineer will forward the resubmittal to the PM after log-in. The PM will review the resubmittal to ensure the submittal comments were addressed. The resubmittal will then be forwarded to the Project QC Manager, or returned to the Contractor as may be appropriate.
- ...after technical review it is the position of the QCM that the submittal is completely unacceptable, it will be returned to the Subcontractor with the disposition "*Disapproved*" and a meeting will be convened with the Subcontractor to go over the problems with the submittal in an effort to assure general conformity of the next submittal and keep the resubmittal process to a minimum. Similar coordination with the subcontractor will occur should the Contracting Officer's disposition be "*Disapproved.*"

If the Contracting Officer is the approving authority, the submittal is to be transmitted to the Contracting Officer following QCM review (with no less than a "*Approved as Noted*" disposition) with the appropriate certification. The Resident Engineer will then tickle the submittal for return within the 20 day Contracting Officer review window.

The Resident Engineer will continuously monitor the submittal process and evaluate its flow, advising the PM and Project QC Manager weekly of the process status. If, in the opinion of the PM, the Subcontractor is not providing generally conforming submittals, or is not adequately addressing the review comments, he will notify the Subcontractor and meet with the appropriate representatives to correct the problem.

Once the overall review process is complete for a specific submittal, regardless of the disposition, the Resident Engineer will file the permanent file copy, return the submittal to the Subcontractor or Vendor/Supplier and route a copy of the submittal to the Project QC Manager. The Project QC Manager will retain copies of the submittals as working copies for field activities, and will file their set by specification section as opposed to submittal number.

6.5.4.4 Invoice Submittals

Quality assurance of invoices will be a coordinated effort among the PM, Subcontract Administrator, and Program Accountant. The Subcontract Administrator reviews invoices from subcontractors for conformance with subcontract requirements. If the subcontractor invoice meets the requirements/conditions of the subcontract the Subcontract Administrator obtains final written approval from the PM. The Program Accountant prepares the client consolidated invoice and gives to the PM for review of compliance with contract requirements and coordinates preparation of appropriate transmittals and certifications for submittal to the Contracting Officer. The CAM will perform final review on all invoices submitted to the Contracting Officer.

6.5.5 Data Management

Part 8.0 of the contract addresses the environmental data management and required electronic delivery standards. In accordance with the contract requirements, a data management plan will be developed for CTOs performed under the Navy RAC program. The data management plan describes the identification, collection, organization, storage, reporting, and archival of information related to the CTO project. The data management plan can be a stand-alone document or it can be a section in the project plan. At a minimum, the data management plan addresses the issues, as detailed below.

6.5.5.1 Overview

The overview gives a brief description of the data collection and reporting aspects of the CTO project. A data flow chart (or set of charts) that illustrates the paths of information is provided, along with text describing each step in the flow chart.

6.5.5.2 Staffing and Responsibilities

The staff positions involved with data collection, management, and reporting are identified. The responsibilities of the positions should be clearly described. Finally, names should be assigned to each position. On smaller projects, it is not uncommon to have the same person assigned to multiple positions. At a minimum, each project has the following positions (and responsibilities) identified:

- Project data manager to oversee the management of project data
- Database specialist to oversee the database operations, load data into the database, check the integrity of information in the database, generate reports from the database
- Data clerk to enter data into the database, data filing, report formatting

6.5.5.3 Data Management System

The electronic data management and reporting system(s) used in the CTO will be identified and described. In the description of the each data system, include the name and platform of the database (e.g., Access, SQL Server, Oracle) and the name (e.g., EDMS, ArcInfo, MGE) and platform (e.g., Access, Visual Basic, proprietary) of all client applications that are used to process data.

6.5.5.4 Field Data Collection

The data to be captured in the field in support of data analysis and reporting is identified and described in this section. Also included are location and sample identification protocols, bearing in mind that the location and sample identifiers are to be unique among all CTO projects within each DOD installation. The sources of the information (i.e., soil boring logs, well completion logs, sampling logs) are identified and examples of them are provided. If information is manually transcribed from a hard copy source into an application, the process(es) by which the transcribed information will be verified is described.

6.5.5.5 Analytical Laboratory Data Collection

The data that will be captured from the analytical and geotechnical laboratories is identified and described in this section. The format and content of both the hard copy and electronic data deliverables is addressed in this section of the data management plan. The processes by which data is imported from the electronic data deliverable into the database is described, as is the method of verification of the data transfer.

6.5.5.6 Analytical Data Quality Evaluation and Validation

The processes by which validation flags for analytical results are entered into the database and then verified are described in this section of the data management plan. Since not all projects will require data validation, this section may be marked as "Not applicable to this project."

6.5.5.7 Generation of Navy Environmental Data Transfer Standard Deliverables

The tools and processes required to generate and review the Navy Environmental Data Transfer Standard (NEDTS), version 2.01, deliverables is identified and described in this section of the data management plan. Only those projects that collect and report non-spatial information are required to generate a NEDTS data deliverable. The NEDTS deliverable will be provided to the information management division of the military facility or the reporting agency designated by the facility in the project CTO.

The NEDTS deliverable consists of up to 34 data files containing information related to the project. The tables that will actually be populated and reported for a particular project will be identified in the CTO. If not specified by the client in the CTO, the PM will identify in the data management plan which tables will be delivered. Valid values for the tables in the database will be maintained by the project data manager.

6.5.5.8 Adherence to the Tri-Service Spatial Data Standard

The Tri-Service Spatial Data Standard (TSSDS), version 1.75, will be followed in all geographical information system (GIS) or computer-aided drafting and design (CADD) deliverables. The TSSDS specifies valid values to be used for the attributes of maps and other drawings. TSSDS-compliance on existing GIS platforms, such as Environmental System Research Institute's Arc/Info and Integraph's MGE/ERMA, have been worked out by CCI and are currently used in other DOD projects.

6.6 References

Southern Division Navy RAC Contract N62467-98-D-0995

Naval Facilities Engineering Command *RAC Contract Manual (NAVFAC P-1092)*
Southern Division, Naval Facilities Engineering Command *Response Action Contract Guide*
(May 19, 1995)

Tri-Service Spatial Data Standards (TSSDS)

Navy Environmental Data Transfer Standards (NEDTS 2.01)

Executive Order 12906 "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure"

OMB Circular No. A-16 ("Coordination of Surveying, Mapping, and Related Spatial Data Activities")

ASTM A 880, 1989 Criteria for use in Evaluation of Testing Laboratories and Organizations for Examination and Inspection of Steel, Stainless Steel, and Related Alloys

ASTM C 1077, 1990 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

ASTM D 3666, 1990 (Rev. A) Evaluating and Qualifying Agencies Testing and Inspecting Bituminous Paving Materials

ASTM D 3740, 1988 Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

ASTM E 319, 1990 Applicable for Evaluation of Testing and Inspection Agencies as Used in Construction

ASTM E 543, 1989 (Rev. A) Determining the Qualifications of Nondestructive Testing Agencies

ASTM Designation D 3951-88, Standard Practice for Commercial Packaging

Military Standard 129, Marking for Shipment and Storage

CH2M HILL *Quality Management Program*

CH2M HILL *Quality Assurance Program Plan, Woolfolk Chemical Works Site*

Requirements for Quality Control of Analytical Data, HAZWRAP Support Contractor Office

CH2M HILL *Construction Inspection Manual*

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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	CH2M HILL 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 ³	milligrams per cubic meter
MSDS	Material Safety Data Sheet
mW/cm ²	milliwatt per square centimeter
NAS	Naval Air Station
NDG	nuclear density gauge
NSA	Naval Support Activity
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
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
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, Naval Facilities Engineering Command (NAVFAC)

Project No: Contract Task Order (CTO) 0055

CCI Project Manager: Matt Haupt

Office: Atlanta, Georgia (ATL)

Site Name: Naval Support Activity (NSA) Mid-South

Site Address: Millington, Tennessee

Date Health and Safety Plan Prepared: February 2001

Date(s) of Initial Visit: December 2000

Date(s) of Site Work: February – December 2001

Site Access: Access is not restricted as the base has been turned over to the City of Millington.

Site Size: The base occupies several square miles and include flight operations areas.

Site Topography: flat plains with vegetation

Prevailing Weather: hot humid summers with cold winter with potential for snow

Site Description and History: The base was closed in Base Realignment and Closure (BRAC) III in 1998 and turned over to the City of Millington.

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: Matt Haupt/ATL

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:

- Test pit excavation
- Drilling, Geoprobe, Well installation
- Groundwater monitoring, Aquifer testing
- Surface water/sediment sampling from boat
- Surface water/sediment sampling from shore
- Hand auger samples
- Surveying
- Demolition
- Observation of material loading for offsite disposal
- Oversight of remediation and construction
- Construction

2.2.2 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.**

TASKS

- Electrical installation
- Iron work (installing rebar)
- Masonry work
- General heavy equipment (excavation, grading, etc.)
- Mechanical installations (equipment, pumps, etc.)
- Engineering testing/evaluation
- Construction
- Waste removal/hauling
- Demolition

CONTROLS

- Brief on hazards, limits of access, and emergency procedures
- Post contamination areas as appropriate (refer to Section 8.2 for details)
- Sample and monitor as appropriate (refer to Section 5.0)

A task hazard analysis is provided in Table 2-1.

TABLE 2-1
Task Hazard Analysis

Potential Hazards	Tasks										
	Test pit, Excavation HS-32	Drilling, Geoprobe, Well installation	Groundwater monitoring, Aquifer testing	Surface water /sediment sampling from boat	Surface water/ sediment sampling from shore	Hand Auger	Survey	Demolition HS-45	Loading material for offsite disposal	Remediation, construction oversight	Remedial Construction
Aerial Lifts HS-41											X
Arsenic HS-65	X	X	X	X	X	X		X	X		
Asbestos HS-42								X	X		
Benzene HS-67	X	X	X	X	X	X		X			
Blasting								X			X
Buried Utilities, Drums, Tanks	X	X				X		X			X
Cadmium HS-66	X	X	X	X	X	X		X	X		
Compressed Gas HS-63	X	X						X			X
Concrete and Masonry Work HS-43	X	X									X
Confined Space Entry HS-17	X	X	X				X	X			X
Cranes, Hoist, Rigging HS-44	X	X		X				X			X
Diving HS-53				X				X			X
Drilling HS-35		X						X			X
Earthmoving HS-27	X	X						X			X
Electrical HS-23	X	X	X		X	X	X	X			X

TABLE 2-1
Task Hazard Analysis

Potential Hazards	Tasks										
	Test pit, Excavation HS-32	Drilling, Geoprobe, Well installation	Groundwater monitoring, Aquifer testing	Surface water /sediment sampling from boat	Surface water/ sediment sampling from shore	Hand Auger	Survey	Demolition HS-45	Loading material for offsite disposal	Remediation, construction oversight	Remedial Construction
Excavation HS-32	X							X			X
Fall Protection HS-31	X	X			X			X			X
Fire Protection HS-22	X	X	X	X	X	X	X	X	X	X	X
Forklifts HS-48	X	X						X			X
Formaldehyde HS-68	X	X	X	X	X	X		X	X		
Hand and Power Tools HS-50	X	X	X	X	X	X	X	X			X
Heavy Equipment HS-27	X	X		X				X	X		X
Idw Drum Sampling	X	X	X	X	X	X		X	X		
Ionizing Radiation HS-10, 54	X	X	X	X	X	X		X			X
Laboratory, Field, HS-37	X	X	X	X	X	X		X			X
Ladders HS-25	X	X						X			X
Lead HS-57	X	X	X	X	X	X		X	X		X
Lockout/ Tagout HS-33	X	X	X	X	X	X	X	X			X
Manual Lifting HS-29	X	X	X	X	X	X	X	X		X	X

TABLE 2-1
Task Hazard Analysis

Potential Hazards	Tasks										
	Test pit, Excavation HS-32	Drilling, Geoprobe, Well installation	Groundwater monitoring, Aquifer testing	Surface water /sediment sampling from boat	Surface water/ sediment sampling from shore	Hand Auger	Survey	Demolition HS-45	Loading material for offsite disposal	Remediation, construction oversight	Remedial Construction
Methylene Chloride, HS 70	X	X	X	X	X	X		X	X		
Noise >85dBa HS-39	X	X	X	X	X	X	X	X	X	X	X
Platform, Personnel Hs-75	X				X			X			X
Powder Actuated Tools	X	X						X			X
Radar Hs-58	X	X	X	X	X	X	X	X	X	X	X
Respirators HS-08	X	X	X	X	X	X	X	X	X	X	X
Rigging Hs-44	X	X						X	X		X
Scaffolding HS-73								X			X
Steel Erection and Iron Work Hs-62		X						X			X
Traffic Control Hs-24	X	X	X	X	X	X	X	X	X	X	X
Visible lighting	X	X	X	X	X	X	X	X	X	X	X
Vinyl Chloride Hs-69	X	X	X	X	X	X		X			
Welding and Cutting HS-63	X	X						X			X
Working near water					X			X			X
Working from boat				X				X			X

2.2.3 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. Table 2-2 lists safe work practices and control measures used to reduce or eliminate potential hazards for the activities associated with this project. Inspection and training requirements for equipment are listed in Table 2-3. 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 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
General Hazards	Reduce general safety hazards found at most sites as referenced in CH2M HILLSOP 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 and working surfaces.</p>
Hazard Communication	Comply with the Hazard Communication Standard informing worker about the chemical to which they may be exposed as 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 the identity of the chemical and with hazard warnings, and store properly.</p> <p>Give employees required chemical-specific HAZCOM training using the Chemical-Specific Tracking Form provided in Attachment 3.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Chemicals		
Arsenic	Exposure to Arsenic above the PEL as listed in 29 CFR 1926.1118 and referenced in standard 29 CFR 1910.1018 and CH2M HILL SOP HS-65	<p>Do not enter regulated work areas unless training, medical monitoring, and personal protective equipment (PPE) requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Avoid skin and eye contact with liquid and particulate arsenic or arsenic trichloride.</p> <p>Arsenic is considered a "Confirmed Human Carcinogen."</p> <p>Arsenic particulates (inorganic metal dust) are odorless. Vapor and gaseous odor varies depending upon specific organic arsenic compound.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the SSHA or arsenic competent person.</p>
Asbestos	Exposure to Asbestos above the PEL as listed in 29 CFR 1926.1101 and CH2M HILL SOP 42	<p>Materials suspected of containing asbestos will be treated as asbestos unless documentation and/or testing results indicate otherwise.</p> <p>Where the presence of asbestos is suspected, design operations to avoid contact.</p> <p>Do not disturb waste or other materials labeled "Danger - Asbestos Fibers."</p> <p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>
Benzene	Exposure to Benzene above the PEL as listed in 29 CFR 1926.1128 and referenced in standard 29 CFR 1910.1028 and CH2M HILL SOP HS-67	<p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Skin absorption is a potential route of benzene exposure.</p> <p>Benzene is considered a "Confirmed Human Carcinogen."</p> <p>A short term exposure limit (STEL) of 15 minutes exists for this material.</p> <p>Benzene has an aromatic odor.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Cadmium	Exposure to Cadmium above the PEL as listed in 29 CFR 1926.1127 and CH2M HILL SOP HS-66	<p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Cadmium is considered a "Suspected Human Carcinogen."</p> <p>Cadmium particulates (fumes and dust) are odorless.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>
Formaldehyde	Exposure to Formaldehyde above the PEL as listed in 29 CFR 1926.1148 and referenced in standard 29 CFR 1910.1048 and CH2M HILL SOP-68	<p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Formaldehyde is considered a "Suspected Human Carcinogen."</p> <p>An STEL of 15 minute exists for this material.</p> <p>Formaldehyde has a pungent, suffocating odor.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>
Lead	Exposure to Lead above the PEL as listed in 29 CFR 1926.62 and CH2M HILL SOP-57	<p>Work activities involving cutting, grinding, burning, welding, and other abrasive operations performed on any painted and/or coated surfaces should be treated as having an increased potential for lead exposure.</p> <p>Surfaces suspected of containing lead will be treated as lead unless documentation and/or testing results indicate otherwise.</p> <p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>Do not launder work clothes with ordinary clothes.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p> <p>The following requirements pertain to lead contaminated soils:</p> <p>Work will progress in a sequence from less contaminated to more contaminated areas.</p> <p>Water should be added to soils prior to and during excavation, air rotary drilling, and other activities that create or have the potential to create airborne lead contaminated dust. For air rotary drilling operations, water can be added to the boring to reduce dust generation from the cyclone. Depending upon soil type, watering of soil may be required several days prior to commencing ground intrusive activities.</p> <p>Personnel working in the vicinity of lead contaminated soil will wear disposable coveralls or equal and exercise enhanced personal hygiene (i.e., frequent hand washing prior to eating, drinking, smoking; separation of work and street clothing/footwear; etc.).</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Methylene Chloride	Exposure to Methylene Chloride above the PEL as listed in 29 CFR 1926.1152 and referenced in standard 29 CFR 1910.1052 and CH2M HILL SOP-70	<p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>An STEL of 15 minutes and a Ceiling Limit (not to exceed) exists for this material.</p> <p>Methylene chloride has a faint, sweet odor, which is not noticeable at dangerous concentrations.</p> <p>Methylene chloride is shipped as liquefied compressed gas.</p> <p>Methylene chloride will cause frostbite on contact.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>
Vinyl Chloride	Reduce the exposure potential to Vinyl Chloride as referenced in 29 CFR 1926.1117 and CH2M HILL SOP HS-69	<p>Vinyl chloride is considered a "Confirmed Human Carcinogen."</p> <p>Vinyl chloride has a mild, sweet, chloroform-like odor.</p> <p>Do not enter regulated work areas unless training, medical monitoring, and PPE requirements established by the competent person have been met.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.</p> <p>An STEL of 15 minutes exists for this material.</p> <p>Respiratory protection and other exposure controls selection will be based on the most recent exposure monitoring results obtained from the competent person.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Physical Conditions		
Aerial Lifts	Reduce risk to equipment and personnel when lifting materials as referenced in 29 CFR 1926, Subpart N, and CH2M HILL SOP-41	<p>Only authorized and trained personnel are permitted to operate aerial lifts.</p> <p>Inspect aerial lifts and test lift controls prior to use.</p> <p>Wear a full body harness with lanyard attached to the boom or platform. For scissors lifts where a standard guardrail system is installed and you are working within the confines of such a system, full body harness and lanyard are not required.</p> <p>Do not attach lanyard to adjacent structure or equipment while working from aerial lift.</p> <p>Stand firmly on the floor of the platform and do not sit or climb on the railings of the platform or use planks, ladders, or other devices to increase working height.</p> <p>Remain in platform at all times and do not leave platform to climb to adjacent structures.</p> <p>Position aerial lifts on firm, level surfaces when possible, with the brakes set. Use wheel chocks on inclines. If outriggers are provided, position on solid surfaces or cribbing.</p> <p>Maintain safe clearance distances between overhead power lines and any part of the aerial lift or conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.</p> <p>Do not exceed the boom and basket load limits.</p> <p>Do not use aerial lifts as cranes, unless specifically designed/approved by manufacturer.</p> <p>Do not work or stand below aerial lift operations.</p> <p>Do not use aerial lifts when winds exceed 30 miles per hour.</p>
Blasting	Reduce the risk of injury and damage when blasting as referenced in 29 CFR 1926, Subpart U	<p>Only authorized and trained personnel will handle and use explosives.</p> <p>Open flames or other ignition sources will be prohibited in or near explosive magazines or while explosives are being handled, transported, or used.</p> <p>Visual and audible warning signals, flags, or barricades will be used to warn personnel of blasting operations.</p> <p>Blasting above ground conducted between sunup & sundown, where possible.</p> <p>Special precautions will be taken to control the throw of fragment during loading, delaying, initiation, and confinement of each blast.</p> <p>Precautions will be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent powerlines, dust storms, or other sources of electricity.</p> <p>Explosives not being used will be kept in a locked magazine.</p> <p>Explosives will be accounted for at all times. An inventory and use record will be maintained for all explosives.</p> <p>Transportation of explosives will be in accordance with DOT regulations.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
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>
Confined Space Entry	Reduce risk of accident or injuries during a confined space entry as referenced in 29 CFR 1910.146 and CH2M HILL SOP HS-17	<p>Confined space entrants, attendants, and entry supervisors must complete the CH2M HILL 8-Hour Confined Space Entry training.</p> <p>A Confined Space Entry Permit (CSEP), Alternative Procedure Certificate (APC), or Non-permit Certificate (NPC) must be completed and posted near the space entrance point for review.</p> <p>Each confined space entrant and attendant must attend a pre-entry briefing conducted by the entry supervisor.</p> <p>Each confined space entrant and attendant must verify that the entry supervisor has authorized entry and that all permit or certificate requirements have been satisfied.</p> <p>Only individuals listed on the Authorization/Accountability Log are permitted to enter the space.</p> <p>Each confined space entrant and attendant must verify that atmospheric monitoring has been conducted at the frequency specified on the permit or certificate and that monitoring results are documented and within acceptable safe levels.</p> <p>The following requirements must be met during confined space entry:</p> <p>Communication must be maintained between the attendant and entrants to enable the attendant to monitor entrant status.</p> <p>Entrants must use equipment specified on the permit or certificate accordingly.</p> <p>All permit or certificate requirements must be followed.</p> <p>Entrants must evacuate the space upon orders of the attendant or entry supervisor, when an alarm is sounded, or when a prohibited condition or dangerous situation is recognized.</p> <p>Entrants and attendants must inform the entry supervisor of any hazards confronted or created in the space or any problems encountered during entry.</p>
Compressed gasses	Reduce the hazards when working with compressed gasses	<p>Valve caps must be in place when cylinders are transported, moved, or stored.</p> <p>Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.</p> <p>Cylinder valves must be closed when cylinders are not being used and when cylinders are being moved.</p> <p>Cylinders must be shielded from welding and cutting operations and positioned to avoid being struck or knocked over; contacting electrical circuits; or exposed to extreme heat sources.</p> <p>Cylinders must be secured on a cradle, basket, or pallet when hoisted; they may not be hoisted by choker slings.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Diving	Reduce the hazards from performing diving operations as referenced in 29 CFR 1926 Subpart Y and CH2M HILL SOP HS-53	<p>Dive team members must have the experience and/or training in the use of tools, equipment and systems relevant to assigned tasks; techniques of the assigned diving mode; diving operations; and emergency procedures.</p> <p>Dive team members must be trained in cardiopulmonary resuscitation and standard first aid.</p> <p>Dive team members who are exposed to or control the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.</p> <p>A "designated person-in-charge" must be at the dive location and in charge of all aspects of the diving operation affecting the safety and health of dive team members. The designated person-in-charge shall have experience and training in the conduct of the assigned diving operation.</p> <p>Diving operations must be conducted in accordance with the CH2M HILL Commercial Diving Safe Practices Manual provided in Attachment 5.</p>
Drilling	Reduce the hazards from drilling operations as 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> <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 as 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> <p>The Energized Electrical Work permit provided in Attachment 4 of this plan must be completed prior to working on unprotected energized electrical systems.</p> <p>Follow control measures & procedures identified on Energized Electrical Work permit.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Fall Protection	To reduce accidents from falls as referenced in 29 CFR 1926.500 and CH2M HILL SOP HS-31	<p>Fall protection systems must be used to eliminate fall hazards when performing construction activities at a height of 6 feet or greater and when performing general industry activities at a height of 4 feet or greater.</p> <p>Staff exposed to fall hazards must complete the CH2M HILL Fall Protection training course and receive project-specific fall protection training. Do not use fall protection systems on which you have not been trained.</p> <p>The SHSS must complete the Project Fall Protection Evaluation Form and provide project-specific fall protection training to all staff exposed to fall hazards. The Project Fall Protection Evaluation Form is provided in Attachment 4 of this plan.</p> <p>The SHSS will act as competent person and will inspect and oversee the use of fall protection systems. Follow all requirements established by the competent person for the use and limitation of fall protection systems.</p> <p>A registered professional engineer will oversee the use of horizontal lifelines.</p> <p>Only one person will be simultaneously attached to a vertical lifeline.</p> <p>Remain within the guardrail system when provided. Leaning over or stepping across a guardrail system is not permitted.</p> <p>Do not stand on objects (boxes, buckets, bricks, blocks, etc.) or ladders to increase working height on top of platforms protected by guardrails.</p> <p>Inspect personal fall arrest systems prior to each use. Do not use damaged fall protection systems at any time, or for any reason.</p> <p>Set-up personal fall arrest systems so that you can neither free-fall more than 6 feet nor contact any lower level.</p> <p>Only attach personal fall arrest systems to anchorage points capable of supporting at least 5,000 pounds.</p> <p>Use fall protection equipment for fall protection only and not to hoist materials. Do not use personal fall arrest systems that have been subjected to impact loading.</p>
Fire Protection	To reduce the incidents of fires and provide resources to fight fires as 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>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Investigation Derived Drum Sampling	Reduce the potential for chemical exposure when sampling drums as referenced in 29 CFR 1910.120.	<p>Minimize transportation of drums.</p> <p>Sample only labeled drums or drums known to contain IDW.</p> <p>Use caution when sampling bulging or swollen drums. Relieve pressure slowly.</p> <p>If drums contain, or potentially contain, flammable materials, use non-sparking tools.</p> <p>Picks, chisels, and firearms may not be used to open drums.</p> <p>Reseal bung holes or plugs whenever possible.</p> <p>Avoid mixing incompatible drum contents.</p> <p>Sample drums without leaning over the drum.</p> <p>Transfer the content of drums using a method that minimizes contact with the material.</p> <p>PPE and air monitoring requirements specified in this HSP must be followed.</p> <p>Spill containment procedures must be appropriate for the material to be handled.</p>
Laboratories, Field	Reduce the hazards from operation of a Field Laboratory as referenced in 29 CFR 1910.1450 and CH2M HILL SOP HS-37	<p>Personnel must complete the computer-based Laboratory Safety training module.</p> <p>Personnel must complete the general laboratory medical monitoring protocol and be approved for such activities.</p> <p>Personnel must receive chemical-specific hazard communication training on the chemicals to which they are exposed.</p> <p>Personnel who are exposed to methylene chloride must complete the computer-based Methylene Chloride training module.</p> <p>Personnel must read and follow the requirements of the Chemical Hygiene Plan.</p>
Ladders	Reduce the hazards from climbing and operating ladders as referenced in 29 CFR 1926, Subpart X and CH2M HILL SOP HS-25	<p>Ladders must be inspected by a competent person for visible defects prior to each day's use. Defective ladders must be tagged and removed from service.</p> <p>Portable ladders must extend at least 3 feet above landing surface.</p> <p>User must face the ladder when climbing; keep belt buckle between side rails.</p> <p>User must use both hands to climb, use rope to raise and lower equipment and materials.</p> <p>Straight and extension ladders must be tied off to prevent displacement.</p> <p>Ladders that may be displaced by work activities or traffic must be secured or barricaded.</p> <p>Fixed ladders greater than or equal to 20 feet in height must be provided with fall protection devices.</p> <p>Stapladders are to be used in the fully opened and locked position.</p> <p>Users are not to stand on the top two steps of a stepladder, nor are users to sit on top or straddle a stepladder.</p> <p>Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Personnel Platforms	Reduce the potential for accidents when lifting personnel in the air as referenced in 29 CFR 1925.552 and CH2M HILL SOP HS-75	<p>Crane-suspended personnel platforms will be used only when the use of conventional means (ladders, stairways, aerial lifts, or scaffolding) would be more hazardous or is not possible because of structural design or worksite conditions.</p> <p>Platforms and suspension systems must be designed by a qualified engineer or a qualified person competent in structural design.</p> <p>Platforms will not be used until the trial lift, inspections, and proof testing have been successfully completed.</p> <p>Personnel to be hoisted must first attend a pre-lift meeting to review the appropriate procedures to be followed.</p> <p>Personnel must wear a body harness system with lanyard appropriately attached to the lower load block or overhaul ball, or to a structural member within the personnel platform capable of supporting a fall impact.</p> <p>Personnel must keep all parts of the body inside the platform during raising, lowering, and positioning.</p> <p>Personnel being hoisted must remain in continuous sight of and in direct communication with crane operator or signal person. In situations where direct visual contact with operator is not possible, and use of a signal person would create a greater hazard for the person, direct communication alone such as by radio may be used.</p> <p>Platforms must be hoisted in a slow, controlled, cautious manner with no sudden movements of the crane or the platform.</p> <p>Platform tag lines must be used unless their use creates an unsafe condition.</p> <p>Before exiting or entering a platform that is not landed, the platform must be secured to the structure where the work is to be performed, unless securing to the structure creates an unsafe situation.</p> <p>The crane operator must remain at the controls at all times when the crane engine is running and the platform is occupied.</p> <p>No lifts will be made on another of the crane's loadlines while personnel are suspended on a platform.</p> <p>Hoisting of personnel will be promptly discontinued upon indication of any dangerous weather conditions or other impending danger.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
<p>Power Actuated Tools</p>	<p>Reduce the potential for accidents and injuries when using power actuated tools as referenced in 29 CFR 1926.302 and CH2M HILL SOP HS-50</p>	<p>Only trained personnel are permitted to operate power-actuated tools.</p> <p>Inspect test power-actuated tools each day before they are loaded per manufacturer's instruction. Remove from service any tool that is not in proper working order.</p> <p>Wear appropriate personal protective equipment (eye, face, and hearing protection) when using powder-actuated tools.</p> <p>Never point power-actuated tools at other workers, whether empty or loaded. Tools will not be loaded until just before use. Never leave loaded tools unattended.</p> <p>Do not drive fasteners into very hard or brittle materials such as, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.</p> <p>Avoid driving fasteners into easily penetrable materials unless backing is provided. Pins or fasteners can otherwise become flying missiles when they pass right through such materials.</p> <p>Use power-actuated tools with the manufacturer's specified guard, shield, or other attachment.</p> <p>Do not use power-actuated tools in explosive or flammable atmospheres.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Radar	Reduce the potential for exposure the non-ionizing radiation from radar installations as referenced in 29 CFE 1910.97 and CH2M HILL SOP HS-58	<p>Airports and all branches of the military use radar of significant power for buildings, towers, aircraft, ships, armor vehicles and installations in general. Radar devices may emit harmful microwave radiation emissions.</p> <p>Microwave radiation is absorbed by the body and dissipated in the tissue as heat.</p> <p>The penetration ability of the radiation depends on the wavelength. Microwave wavelengths of 25-200 centimeters have the ability to reach the internal organs with potentially damaging effects. Wavelengths less than 25 centimeters are absorbed and dissipated by the skin and the human body is thought to be transparent to microwave wavelengths greater than 200 centimeters.</p> <p>The health effects of microwave radiation include deep burns and thermal damage to any organ or organ system with low blood flow, most notably the lenses of the eyes. If adequate time has elapsed between exposures, the repair mechanisms of the lens seems to limit damage.</p> <p>Studies have demonstrated that chronic microwave exposure can cause both psychological changes, disrupting task and function control, as well as chronic depression. Further studies suggest a possible relationship between mongolism (Down's Syndrome) in offspring and previous exposure of the male parent to radar, however the study was not conclusive.</p> <p>Microwave radiation can not be seen and its effects can not be felt until serious damage has already occurred.</p> <p>Because of the inconclusive effects of microwave radiation, Occupational Safety and Health Administrative (OSHA) has set a conservative exposure limit of 10 milliwatt per square centimeter (10 mW/cm²) averaged over any 6-minute period.</p> <p>Warning signs must be posted in areas where potentially damaging microwave radiation exists.</p> <p>Prevention method for microwave radiation exposure is to not be in the path of radar or other microwave emitting devices by either ensuring that the device is not operating or ensuring that there is sufficient shielding between you and the microwave source.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Radiation	Reduce the potential for ionizing radiation exposure as referenced in 29 CFR 192.53 and CH2M HILL SOP HS-10	<p>Do not enter restricted work areas unless training, medical monitoring, personal monitoring equipment, and PPE requirements established by the radiation protection competent person have been met.</p> <p>Know your quarterly dose margin and do not exceed your personal limits.</p> <p>Assure personal monitoring devices are worn properly. Always calibrate pocket dosimeters prior to entering and exiting restricted areas.</p> <p>Plan activities to minimize exposure, i.e., as low as reasonably achievable (ALARA) and waste generation.</p> <p>Limit the amount of potential waste (e.g., packaging, boxes, paperwork, etc.) brought into restricted areas.</p> <p>Do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in restricted areas.</p> <p>Promptly report any condition which may lead to or cause a violation of radiation protection standards.</p> <p>Assure radioactive sources, containers, and the area are properly labeled and posted.</p> <p>Protective clothing and other exposure controls will be based on the most recent survey results obtained from the radiation protection competent person.</p> <p>Know the emergency evacuation warning signals and be prepared to respond.</p> <p>Do not leave radioactive source materials and equipment unattended.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Respiratory Protection	Perform respiratory protection in a safe and healthful manner as referenced in 29 CFR 1926.103 and CH2M HILL SOP HS-0	<p>Respirator users must have completed appropriate respirator training within the past 12 months. SC training is required for air-purifying respirators (APR) use and Level B training is required for supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA) use. Specific training is required for the use of powered air-purifying respirators (PAPR).</p> <p>Respirator users must complete the respirator medical monitoring protocol and been approved for the specific type of respirator to be used.</p> <p>Tight-fitting facepiece respirator (negative or positive pressure) users must have passed an appropriate fit test within past 12 months.</p> <p>Respirator use will be limited to those activities identified in this plan. If site conditions change that alter the effectiveness of the specified respiratory protection, the HSM will be notified to amend the written plan.</p> <p>Tight-fitting facepiece respirator users will be clean-shaven and will perform a user seal check before each use.</p> <p>Canisters/cartridges will be replaced according to change-out schedule specified in this plan. Respirator users will notify SHSS of any detection of vapor or gas breakthrough.</p> <p>SHSS will report any breakthrough events to HSM for schedule upgrade.</p> <p>Respirators in regular use will be inspected before each use and during cleaning</p> <p>Respirators in regular use will be cleaned and disinfected as often as necessary to ensure they are maintained in a clean and sanitary condition.</p> <p>Respirators will be properly stored to protect against contamination and deformation.</p> <p>Field repair of respirators will be limited to routine maintenance. Defective respirators will be removed from service.</p> <p>When breathing air is supplied by cylinder or compressor, the SHSS will verify the air meets Grade D air specifications.</p> <p>The SHSS will complete the H&S Self-Assessment Checklist – Respiratory Protection include in Attachment 5 of this plan to verify compliance with CH2M HILL’s respiratory protection program.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Traffic Control	Reduce accidents related to control of traffic and impacts as referenced in CH2M HILL SOP HS-24	<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> <p>When workers must face away from traffic, a “buddy system” should be used, where one worker is looking towards traffic.</p> <p>When working on highway projects, obtain copy of the contractor’s traffic control plan.</p> <p>Work area should be protected by a physical barrier such as a K-rail or Jersey barrier.</p> <p>Review traffic control devices to ensure that they are adequate to protect your work area. Traffic control devices should: 1) convey a clear meaning, 2) command respect of road users, and 3) give adequate time for proper traffic response. The adequacy of these devices are dependent on limited sight distance, proximity to ramps or intersections, restrictive width, duration of job, and traffic volume, speed, and proximity.</p> <p>Either a barrier or shadow vehicle should be positioned a considerable distance ahead of the work area. The vehicle should be equipped with a flashing arrow sign and truck-mounted crash cushion (TMCC). All vehicles within 40 feet of traffic should have an orange flashing hazard light atop the vehicle.</p> <p>Except on highways, flaggers should be used when 1) two-way traffic is reduced to using one common lane, 2) driver visibility is impaired or limited, 3) project vehicles enter or exit traffic in an unexpected manner, or 4) the use of a flagger enhances established traffic warning systems.</p> <p>Lookouts should be used when physical barriers are not available or practical. The lookout continually watches approaching traffic for signs of erratic driver behavior and warns workers. Vehicles should be parked at least 40 feet away from the work zone and traffic. Minimize the amount of time that you will have your back to oncoming traffic.</p>

TABLE 2-2
Recommended Safety Controls

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Welding and Cutting	Reduce the physical hazards from welding and cutting as referenced in 29 CFR 1926, Subpart J and CH2M HILL SOP HS-63	<p>Only authorized/trained personnel are permitted to operate welding/cutting equipment.</p> <p>Do not enter areas where welding/cutting operations are taking place unless completely necessary and only after receiving permission from the welding/cutting operator.</p> <p>If you must be present in an area during welding/cutting operations, position yourself behind flash screens or wear glasses/goggles with lenses of appropriate darkness.</p> <p>Do not look directly at the welding/cutting flash or at reflective surfaces surrounding welding/cutting operations.</p>
Working Near Water	Reduce accidents that occur working near water as referenced in 29 CFR 1926.106	<p>U.S. Coast Guard-approved personal flotation devices (PDFs), or life jackets, provided for each employee will be worn.</p> <p>PDFs 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 as 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 2-3
Equipment Inspection and Training Requirements

Equipment To Be Used	Inspection Requirements	Training Requirements
<p>Forklifts, HS-48</p>	<p>Forklifts will be inspected by the operator prior to use.</p> <p>No part of a load must pass over any personnel.</p> <p>Forklifts left unattended must be immobilized and secured against accidental movement and forks, buckets or attachments must be in lowered position or be firmly supported.</p> <p>No load may exceed the maximum rated load and loads must be handled in accordance with the height and weight restrictions on the load chart.</p> <p>When a load is in the raised position, the controls must be attended by an operator.</p> <p>If an operator does not have a clear view of the path, a signaler must be used.</p> <p>Loads must be carried as close to the ground or floor as the situation permits.</p> <p>Loads that may tip or fall must be secured.</p> <p>Where a forklift is required to enter or exit a vehicle to load or unload, the vehicle must be immobilized and secured against accidental movement.</p> <p>Forklifts will not be used to support, raise or lower workers.</p> <p>Forklifts operators will wear seatbelts at all times.</p> <p>Concentrations of carbon monoxide created by forklift operation indoors must be monitored when potential exists for reaching or exceeding permissible exposure limits.</p> <p>Barriers, warning signs, designated walkways or other safeguards must be provided where pedestrians are exposed to the risk of collision.</p>	<p>Only authorized and trained personnel are permitted to operate forklifts.</p>

TABLE 2-3
Equipment Inspection and Training Requirements

Equipment To Be Used	Inspection Requirements	Training Requirements
Trackhoes Backhoes Excavators Bucket Cranes Bull Dozers HS-27	<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 it can lurch forward or backward. 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>Do not ride on earthmoving equipment unless it is specifically designed to accommodate passengers. Only ride in seats that are provided for transportation and that are equipped with seat belts.</p> <p>Earthmoving equipment will not be used to lift or lower personnel.</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>
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>	<p>Only state licensed personnel may operate company vehicles.</p>

TABLE 2-3
Equipment Inspection and Training Requirements

Equipment To Be Used	Inspection Requirements	Training Requirements
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

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

	Heat Syncope	Heat Rash (<i>miliaria rubra</i> , "prickly heat")	Heat Cramps	Heat Exhaustion	Heat Stroke
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 not hot—water. Have victim drink warm fluids, but not 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 not 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
Snakes 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. DO NOT 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.
Poison ivy, poison oak, and poison sumac 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 bloodborne pathogens 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.
Bees and other stinging insects 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.
Other potential biological hazards	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 permethrin, 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
Isobutylene (calibration gas)	1 liter, compressed gas	Support Zone
Methane (calibration gas)	1 liter, compressed gas	Support Zone
Pentane (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
Buffers Ph	< 500 ml	Support/Decontamination Zone
MSA Cleaner/Sanitizer (respirators)	Powder packets	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	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Arsenic	0.01 mg/m ³	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	NA
Benzene	1 ppm	500 Ca	Eye, nose, skin, and respiratory irritation; headache; nausea; dermatitis; fatigue; giddiness; staggered gait; bone marrow depression	9.24
2-Butanone (Methyl Ethyl Ketone, MEK)	200 ppm	3,000	Eye, skin, and nose irritation; headache; dizziness; vomiting; dermatitis	9.54
Cadmium	0.005 mg/m ³	9 Ca	Pulmonary edema, coughing, chest tightness/pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, difficulty breathing, loss of sense of smell, emphysema, mild anemia	NA
Carbon Tetrachloride	2 ppm	200 Ca	Central nervous system (CNS) depression, nausea, vomiting, eye and skin irritation, liver and kidney injury, drowsiness, dizziness	11.47
Chlordane	0.5 mg/m ³	100 Ca	Blurred vision, confusion, ataxia, delirium, coughing, abdominal pain, nausea, vomiting, diarrhea, irritability, tremors anuria	UK
Chlorobenzene	10 ppm	1,000	Skin, eye, and nose irritation; drowsiness; uncoordination; CNS depression	9.07
Chloroform	2 ppm	500 Ca	Dizziness, mental dullness, nausea, confusion, disorientation, headache, fatigue, eye and skin irritation, anesthesia, enlarged liver	11.42
Chromium (as Cr(II) & Cr(III))	0.5 mg/m ³	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Chromium (hexavalent)	0.01 mg/m ³	15 Ca	Irritated respiratory system, nasal septum perforation, liver and kidney damage, leucytosis, leupen, monocytosis, eosinophilla, eye injury, conjunctivitis, skin ulcer, sensitization dermatitis	NA
Cobalt (Metal, Dusts, and Fumes)	0.05 mg/m ³	20	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	NA
Cresol (all isomers of 2-, 3-, & 4-methylphenol)	5 ppm	250	Eye, skin, and mucous membrane irritant; CNS effects including confusion, depression, and respiratory failure; difficulty breathing; irregular rapid respiration; weak pulse; eye and skin burns; dermatitis; lung, liver, kidney, and pancreas damage	8.98
DDT	0.5 mg/m ³	500 Ca	Paresthesia of tongue, lips, hand, and face; tremors; dizziness; confusion; headache; fatigue; convulsion; eye and skin irritation; vomiting	UK
Dibutylphthalate (DBP)	5 mg/m ³	4,000	Eye, upper respiratory system, and stomach irritant	UK
o-Dichlorobenzene (1,2-Dichlorobenzene)	25 ppm	200	Nose and eye irritation, liver and kidney damage, skin blisters	9.06
p-Dichlorobenzene (1,4-Dichlorobenzene)	10 ppm	150 Ca	Headache, eye irritation, nausea, vomiting, swelling periorbital, profus rhinitis, jaundice, cirrhosis	8.98
1,1-Dichloroethane	100 ppm	3,000	CNS depression, skin irritation; liver, kidney, and lung damage	11.06
1,2-Dichloroethane (Ethylene Dichloride)	1 ppm	50 Ca	CNS depression, nausea, vomiting, dermatitis, eye irritation, liver, kidney, and CNS damage; corneal opacity	11.05
Bis-(2-ethylhexyl)phthalate (DEHP, DOP)	5 mg/m ³	5,000 Ca	Eye and mucous membrane irritant	UK
Endosulfan	0.1 mg/m ³	NL	Irritated skin, nausea, confusion, agitation, flushing, dry mouth, tremor, convulsion, headache	UK

TABLE 3-5
Contaminants of Concern

Contaminant	Exposure Limit ^b	IDLH ^c	Symptoms and Effects of Exposure	PIP ^d (eV)
Ethyl Benzene	100 ppm	800	Eye, skin, and mucous membrane irritation; headache; dermatitis; narcotic; coma	8.76
Lead	0.05 mg/m ³	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Mercury	0.05 mg/m ³	10	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumonitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	
Naphthalene	10 ppm	250	Eye irritation, headache, confusion, excitement, nausea, vomiting, abdominal pain, bladder irritation, profuse sweating, dermatitis, corneal damage, optical neuritis	8.12
PCBs (Limits as Aroclor 1254)	0.5 mg/m ³	5 Ca	Eye and skin irritation, acne-form dermatitis, liver damage, reproductive effects	UK
PNAs (Limits as Coal Tar Pitch)	02 mg/m ³	80 Ca	Dermatitis and bronchitis	UK
1,1,2,2-Tetrachloroethane (Tetrachlorethane)	1 ppm	100 Ca	Nausea, vomiting, abdominal pain, finger tremors, jaundice, hepatitis, liver tenderness, monocytosis, kidney damage, dermatitis	11.10
Tetrachloroethylene (PCE)	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
1,1,2-Trichloroethane	10 ppm	100 Ca	Eye and nose irritation, CNS depression, liver damage, dermatitis	11.00
Trichloroethylene (TCE)	50 ppm	1,000 Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
Toluene	50 ppm	500	Eye and nose irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, excessive tearing, nervousness, muscle fatigue, paresthesia, dermatitis, liver and kidney damage	8.82
Xylenes	100 ppm	900	Irritated eyes, skin, nose, and throat; dizziness; excitement; drowsiness; incoherence; staggering gait; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; dermatitis	8.56
Vinyl Chloride	1 ppm	NL Ca	Weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or cyanosis of extremities	9.99
Vinylidene Chloride (1,1-dichloroethylene)	1 ppm	NL Ca	Eye, skin, and throat irritation; dizziness; headache; nausea; difficult breathing; liver and kidney dysfunction; pneumonitis	10.0

Footnotes:

^a Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), S (Surface S

^b Appropriate value of PEL, REL, or TLV listed.

^c IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No Potential occupational carcinogen.

^d PIP = photoionization potential; NA = Not applicable; UK = Unknown.

ppm = parts per million

mg/m³ = milligram per cubic meter

eV – electron volt

4.0 Personnel

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
Matt Haupt	ATL	Project Manager	SC-HW SHSS; FA-CPR
TBD		Site Superintendent	
TBD		SHSS	
Eric Burrell	ATL	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, Naval Facilities Engineering Command, North Charleston, South Carolina

4.2.2 CCI

Project Manager: Matt Haupt/ATL

Health and Safety Manager: Robert Nash/ATL

Site Superintendent: TBD

Site Health and Safety Specialist: TBD

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 CH2M HILL SOP HS-07, Personal Protective Equipment; HS-08, Respiratory Protection

5.1 PPE Specifications

PPE specifications are listed in Table 5-1.

TABLE 5-1
PPE Specifications^a

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

^a Modifications are as indicated. CCI will provide PPE to only CCI employees.

^b No facial hair that would interfere with respirator fit is permitted.

^c Hardhat and splash-shield areas are to determined by the SHSS.

^d Ear protection should be worn while working around drill rigs or other noise-producing equipment or when conversations cannot be held at distances of 3 feet or less without shouting. Refer to Section 6 for other requirements.

^e 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 task that will increase contact or 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 ^a	Frequency ^b	Calibration
PID MiniRAE with 10.6eV lamp or equivalent	0 – ppm – Level D > ppm – Level C > ppm – Stop Work	Initially and periodically during task	Daily
FID OVA model 128 or equivalent	0 – ppm – Level D > ppm – Level C > ppm – Stop Work	Initially and periodically during task	Daily
CGI MSA model 260 or 261 or equivalent	0-10% LEL – No Explosion Hazard 10-25% LEL – Potential Explosion ≥25%LEL – Explosion Hazard; Evacuate or vent	Continuous during intrusive activities	Daily
O₂Meter: MSA model 260 or 261 or equivalent	>25% O ₂ – Explosion Hazard evacuate or vent >19.5-25% O ₂ – Normal <19.5 % O ₂ – O ₂ Deficient: vent or use SCBA	Continuous during intrusive activities	Daily
Dust Monitor: Miniram model PDM-3 or equivalent	mg/m ³ – Level D mg/m ³ – Level C mg/m ³ – Stop Work	Initially and periodically during task	Daily
Detector Tube: Drager benzene specific 0.5/c (0.5 to 10 ppm range) with pre-tube or equivalent	<0.5 ppm – Level D 0.5-1.0 ppm – Level C >1 ppm – Level B	Initially and periodically when PID/FID >1 ppm	
Detector Tube: Drager Vinyl Chloride specific (0.5 to 30 ppm range) with pre-tube or equivalent	<0.5 ppm – Level D >0.5 ppm – Level B	Initially and periodically when PID/FID >1 ppm	
Radiation Meter^d: Ludlum Model 2 with GM probe model 44-9 or equivalent	Background-3X – Continue work > 3x background – Consult HSM >2 mR/hr – Establish REZ	Initially and periodically during task	Daily
Noise Level Meter^e	<85 dBA – No Action Required 85-120 dBA – Hearing Protection >120 dBA – Stop, re-evaluate	Initially and periodically during task	Daily

^a Action levels apply to sustained breathing-zone measurements above background.

^b 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.).

^c If the measured percent of O₂ is less than 10 percent, an accurate lower explosive limit (LEL) reading will not be obtained. Percent LEL and percent O₂ action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O₂ action levels are required for confined space.

ppm = parts per million

dBA = decibels (absolute)

mg/m³ = milligrams per cubic meter

mR/hr = millirem/per hour

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
PID: TVA 1000	100 ppm Isobutylene	CF= 1.0	100 ppm	1.5 lpm reg T-tubing
FID: TVA 1000	100 ppm methane	NA	100 ppm	2.5 lpm reg T-tubing
CGI: MSA 260,260,, 360, or 361	0.75% pentane	NA	50% LEL + 5% LEL	1.5 lpm reg Direct-tubing
Dust Monitor: MiniRAM- PDM-3	Dust-free air	NA	0.00 mg/m ³ in measure mode	Dust-free area or Z-bag with HEPA filter
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF=53	53 ppm +5 ppm	1.5 lpm REG T-Tubing

ppm = parts per million
LEL = lower explosive limit
mg/m³ = milligrams per cubic meter

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

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

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.

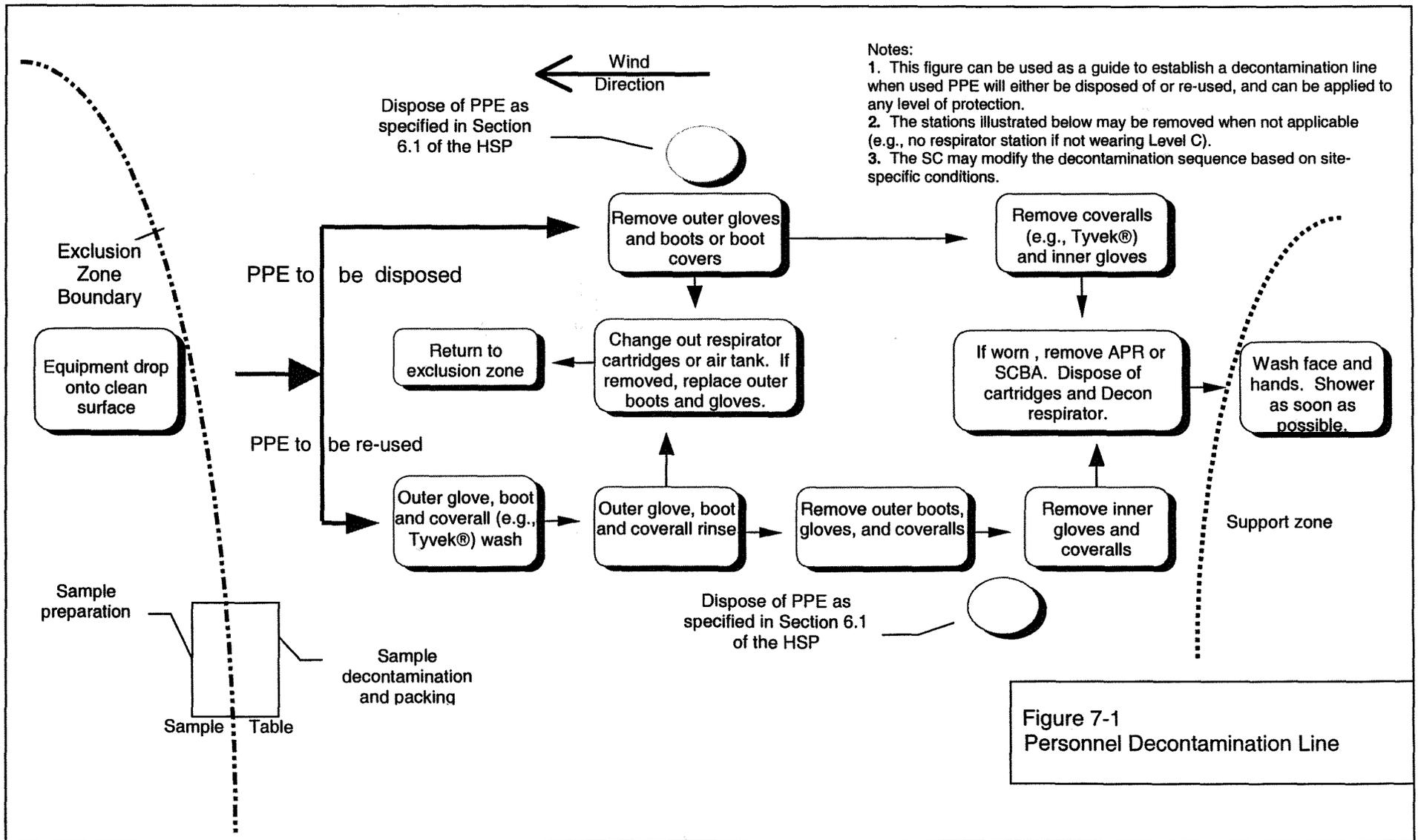


Figure 7-1
Personnel Decontamination Line

8.0 Spill Prevention and Control Plan

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

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

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. Posters can be obtained by calling either 800/548-4776 or 800/999-9111.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Determine wind direction.
- Establish work zones: support, decontamination, and exclusion zones. Delineate work 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.
- Treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the HAZWOPER standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only HAZWOPER-trained personnel (minimum of 24 hours of training) will be permitted to enter the site. All non-HAZWOPER-trained personnel must leave the site.

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

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. Posters can be obtained by calling either 800/548-4776 or 800/999-9111.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- 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

Emergency Equipment and Supplies	Location
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 appropriate 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 and 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.

- Notify the injured person's human resources department within 24 hours.
- Prepare an incident report -- refer to CH2M HILL SOP 12, *Emergency Response and First Aid*. Submit the report to the corporate director of health and safety, Navy RAC health and safety manager, and the corporate human resources department within 24 hours.
- When contacting the medical consultant, state that you are calling about 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.

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 the offsite point upon hearing the emergency signal for a site 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 12-1
Emergency Response Telephone Numbers

Site Address:	Phone: Cellular Phone:
Police: Millington Police	Phone: 911
Fire: Millington Fire Department	Phone: 911
Ambulance: Millington Fire Department	Phone: 911
Hospital: Baptist Memorial Hospital	Phone: 901/476-2621
Address: 1995 US 51, Covington, TN 38019	

*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.

Route to Hospital:

Proceed out of Base and turn EAST on Navy Road to US 51

1.5 miles

Proceed NE up US 51 to Hospital

18.9 miles

Driving Time ~33 minutes

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

11.10 Government Agencies Involved in Project

Federal Agency and Contact Name: Naval Facilities Engineering Command

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 the **SouthDiv 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

CCI Medical Consultant 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.)	SouthDiv Field Safety Contact: Mr. Fletcher Ballzigler; 843/820-5666 1 st Alternate: Mr. David Driggers; 843/820-7466 2 nd Alternate: Ms. Dolores Chester; 843/820-7462
CCI Drug-Free Workplace Program Administrator Alicia Sweeney/ORL 407/423-0001	Site Safety and Health Specialist (SHSS) TBD
Navy RAC Program Manager Scott Newman/ATL 770/604-9095; Cel-phone: 678/488-5988	Project Manager Matt Haupt 770/604-9095
Navy RAC Health and Safety Manager (HSM) Robert Nash/ATL 770/604-9095; Pager: 888/958-9405	Human Resources Manager Nancy Orr /DEN 303/771-0925
Client Eva Clements Naval Facilities Engineering Command	Corporate Human Resources Department Julie Zimmerman/COR 303/771-0900
Federal Express Dangerous Goods Shipping 800/238-5355 CH2M HILL Emergency Number for Shipping Dangerous Goods 800/255-3924	Worker's Compensation and Auto Claims Sterling Administrative Services 800/420-8926 After hours 800/497-4566 Report fatalities & report vehicular accidents involving pedestrians, motorcycles, or more than two cars.

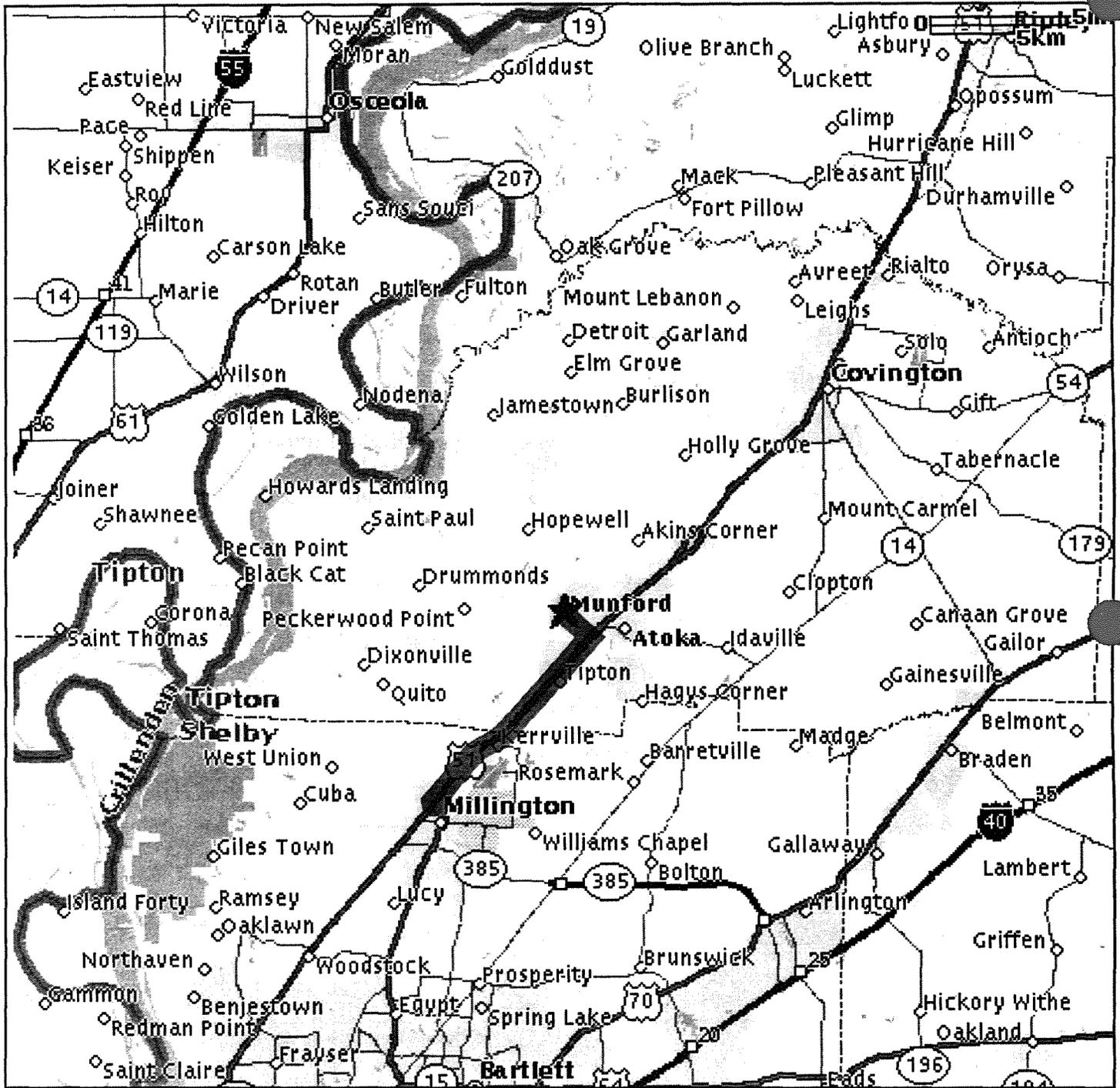


Figure 11-1
Hospital Location Map

12.0 Approval

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: February 2001

12.2 Revisions

Revisions Made by:

Date:

Revisions Approved by:

Date:

13.0 Distribution

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

TABLE 13-1
Distribution List

Name	Office	Responsibility	Number of Copies
Robert Nash	ATL	Health and Safety Manager/Approver	1
Matt Haupt	ATL	Project Manager	1
TBD		Site Superintendent/Field Team	
TBD		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 Memphis

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			
Isobutylene	1 liter, compressed	Support Zone			
Pentane	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			
Ph buffers	< 500 ml	Support Zone			
MSA Sanitizer	< 1 liter	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 Memphis	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

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 ₂ , 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

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
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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 ₂ , 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

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

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

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

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

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

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

SCOTT SPECIALTY GASES -- ISOBUTYLENE IN AIR - CALIBRATION GAS CYL
MATERIAL SAFETY DATA SHEET
NSN: 6665012148247
Manufacturer's CAGE: 51847
Part No. Indicator: A
Part Number/Trade Name: ISOBUTYLENE IN AIR

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

Item Name: CALIBRATION GAS CYL
Company's Name: SCOTT SPECIALTY GASES
Company's Street: ROUTE 611 NORTH
Company's City: PLUMSTEADVILLE
Company's State: PA
Company's Country: US
Company's Zip Code: 18949
Company's Emerg Ph #: 215-766-8861; 908-754-7700
Company's Info Ph #: 215-766-8861
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 005
Status: SMJ
Date MSDS Prepared: 23APR92
Safety Data Review Date: 27SEP94
MSDS Serial Number: BVRGC
Hazard Characteristic Code: G3

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

Proprietary: NO
Ingredient: PROPENE, 2-METHYL-; (ISOBUTYLENE)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: UD0890000
CAS Number: 115-11-7
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: AIR, REFRIGERATED LIQUID; AIR COMPRESSED (UN1002, DOT); AIR
REFRIGERATED LIQUID (CRYOGENIC LIQUID) (UN1003) (DOT)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: AX5271000
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

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

Appearance And Odor: COLORLESS GAS W/POSSIBLE SLIGHT OLEFINIC ODOR.
Boiling Point: -318F, -194C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): 1.2
Specific Gravity: 0.88 (H*20=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 100

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

SCOTT SPECIALTY GASES -- ISOBUTYLENE IN AIR - CALIBRATION GAS CYL
MATERIAL SAFETY DATA SHEET
NSN: 6665012148247
Manufacturer's CAGE: 51847
Part No. Indicator: A
Part Number/Trade Name: ISOBUTYLENE IN AIR

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

Item Name: CALIBRATION GAS CYL
Company's Name: SCOTT SPECIALTY GASES
Company's Street: ROUTE 611 NORTH
Company's City: PLUMSTEADVILLE
Company's State: PA
Company's Country: US
Company's Zip Code: 18949
Company's Emerg Ph #: 215-766-8861; 908-754-7700
Company's Info Ph #: 215-766-8861
Record No. For Safety Entry: 003
Tot Safety Entries This Stk#: 005
Status: SMJ
Date MSDS Prepared: 23APR92
Safety Data Review Date: 27SEP94
MSDS Serial Number: BVRGC
Hazard Characteristic Code: G3

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Ingredients/Identity Information
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Proprietary: NO
Ingredient: PROPENE, 2-METHYL-; (ISOBUTYLENE)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: UD0890000
CAS Number: 115-11-7
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: AIR, REFRIGERATED LIQUID; AIR COMPRESSED (UN1002, DOT); AIR
REFRIGERATED LIQUID (CRYOGENIC LIQUID) (UN1003) (DOT)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: AX5271000
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

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Physical/Chemical Characteristics
=====

Appearance And Odor: COLORLESS GAS W/POSSIBLE SLIGHT OLEFINIC ODOR.
Boiling Point: -318F, -194C
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): 1.2
Specific Gravity: 0.88 (H*20=1)
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: 100

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

Respiratory Protection: USE NIOSH/MSHA APPROVED SCBA IN CASE OF EMERGENCY OR NON-ROUTINE USE.

Ventilation: PROVIDE ADEQUATE GENERAL & LOCAL EXHAUST VENTILATION.

Protective Gloves: RUBBER GLOVES.

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).

Other Protective Equipment: WEAR SAFETY SHOES. A SAFETY SHOWER & EYEWASH STATION SHOULD BE READILY AVAILABLE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: OTHER PREC:BEEN FILLED BY OWNER OR WITH HIS WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR).

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

Trans Data Review Date: 94269
=====

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

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

Label Required: YES

Technical Review Date: 27SEP94

Label Date: 26SEP94

Label Status: G

Common Name: ISOBUTYLENE IN AIR

Chronic Hazard: NO

Signal Word: NONE

Acute Health Hazard-None: X

Contact Hazard-None: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: ACUTE:CONCENTRATION OF ISOBUTYLENE IS THIS MIXTURE SHOULD NOT PRESENT ANY SYMPTOMS OF TOXICITY. CHRONIC:NONE LISTED BY MANUFACTURER.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: SCOTT SPECIALTY GASES

Label Street: ROUTE 611 NORTH

Label City: PLUMSTEADVILLE

Label State: PA

Label Zip Code: 18949

Label Country: US

Label Emergency Number: 215-766-8861; 908-754-7700

Respiratory Protection: USE NIOSH/MSHA APPROVED SCBA IN CASE OF EMERGENCY OR NON-ROUTINE USE.

Ventilation: PROVIDE ADEQUATE GENERAL & LOCAL EXHAUST VENTILATION.

Protective Gloves: RUBBER GLOVES.

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).

Other Protective Equipment: WEAR SAFETY SHOES. A SAFETY SHOWER & EYEWASH STATION SHOULD BE READILY AVAILABLE.

Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.

Suppl. Safety & Health Data: OTHER PREC:BEEN FILLED BY OWNER OR WITH HIS WRITTEN CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR).

=====
Transportation Data
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Trans Data Review Date: 94269
=====

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Disposal Data
=====

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

Label Required: YES

Technical Review Date: 27SEP94

Label Date: 26SEP94

Label Status: G

Common Name: ISOBUTYLENE IN AIR

Chronic Hazard: NO

Signal Word: NONE

Acute Health Hazard-None: X

Contact Hazard-None: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: ACUTE:CONCENTRATION OF ISOBUTYLENE IS THIS MIXTURE SHOULD NOT PRESENT ANY SYMPTOMS OF TOXICITY. CHRONIC:NONE LISTED BY MANUFACTURER.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: SCOTT SPECIALTY GASES

Label Street: ROUTE 611 NORTH

Label City: PLUMSTEADVILLE

Label State: PA

Label Zip Code: 18949

Label Country: US

Label Emergency Number: 215-766-8861; 908-754-7700

Ingredient: SUP DAT:EMER EXISTS. DO NOT ALLOW TEMP WHERE CYLS ARE STORED TO EXCEED 125F (52C). FULL & EMPTY CYLS SHOULD BE (ING 5)

Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 4:BE SEGREGATED. USE A "FIRST IN-FIRST OUT" INVENTORY SYS TO PVNT FULL CYLS BEING STORED FOR EXCESSIVE (ING 6)

Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 5:PERIODS OF TIME. THIS MIX IS NONCORR & MAY BE USED W/ALL MATLS OF CONSTRUCT. MOISTURE CAUSES METAL OXIDES (ING 7)

Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 6:WHICH ARE FORMED W/AIR TO BE HYDRATED SO THAT THEY INCREASE IN VOLUME & LOSE THEIR PROT ROLE (RUST (ING 8)

Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7:FORMATION). CONCS OF SO*2, CL*2, SALT, ETC. IN THE MOISTURE ENHANCES THE RUSTING OF METALS IN AIR.

Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: OTHER PREC:TITLE III, SECTION 313 NOT REQUIRED.

Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

=====
Physical/Chemical Characteristics

=====
Appearance And Odor: COLORLESS GAS WITH VERY SLIGHT PARAFFINIC ODOR.
Boiling Point: SEE INGS
Melting Point: SEE INGS
Vapor Pressure (MM Hg/70 F): SEE INGS
Specific Gravity: (SUPP DATA)
Solubility In Water: VERY SLIGHTLY

=====
Fire and Explosion Hazard Data

Ingredient: SUP DAT:EMER EXISTS. DO NOT ALLOW TEMP WHERE CYLS ARE STORED TO EXCEED 125F (52C). FULL & EMPTY CYLS SHOULD BE (ING 5)

Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 4:BE SEGREGATED. USE A "FIRST IN-FIRST OUT" INVENTORY SYS TO PVNT FULL CYLS BEING STORED FOR EXCESSIVE (ING 6)

Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 5:PERIODS OF TIME. THIS MIX IS NONCORR & MAY BE USED W/ALL MATLS OF CONSTRUCT. MOISTURE CAUSES METAL OXIDES (ING 7)

Ingredient Sequence Number: 06
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 6:WHICH ARE FORMED W/AIR TO BE HYDRATED SO THAT THEY INCREASE IN VOLUME & LOSE THEIR PROT ROLE (RUST (ING 8)

Ingredient Sequence Number: 07
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: ING 7:FORMATION). CONCS OF SO*2, CL*2, SALT, ETC. IN THE MOISTURE ENHANCES THE RUSTING OF METALS IN AIR.

Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO

Ingredient: OTHER PREC:TITLE III, SECTION 313 NOT REQUIRED.

Ingredient Sequence Number: 09
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

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

Appearance And Odor: COLORLESS GAS WITH VERY SLIGHT PARAFFINIC ODOR.
Boiling Point: SEE INGS
Melting Point: SEE INGS
Vapor Pressure (MM Hg/70 F): SEE INGS
Specific Gravity: (SUPP DATA)
Solubility In Water: VERY SLIGHTLY

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

Ventilation: NONE
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: SAFETY SHOES.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: SPEC GRAV: (AIR=1 @ 70F (21.1C)=1.00. HNDLG/
STOR PREC: INCREASE DISCHARGE RATE OF PROD FROM CYL. USE A CHECK VALVE/TRAP
IN DISCHARGE LINE TO PVNT HAZ BACK FLOW INTO CYL. CLOSE VALVE AFTER EACH
USE & WHEN EMPTY. PROT CYLS FROM PHYSICAL DMG. STORE IN COOL, DRY, WELL
VENT AREA AWAY FROM HEAVILY TRAFFICKED AREAS & (ING 4)

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

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

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

Label Required: YES
Technical Review Date: 18NOV94
Label Status: G
Common Name: 0.35% PENTANE AND 19% OXYGEN IN NITROGEN.
Chronic Hazard: NO
Signal Word: NONE
Acute Health Hazard-None: X
Contact Hazard-None: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: THIS MIXTURE SHOULD BE CONSIDERED SIMILAR TO
AIR AND WOULD THEREFORE CAUSE NO SYMPTOMS OF EXPOSURE.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: LIQUID AIR CORP
Label Street: CA PLZ 2121 N CALIFORNIA BLVD
Label City: WALNUT CREEK
Label State: CA
Label Zip Code: 94596
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

Ventilation: NONE
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPROVED CHEM. WORKERS GOGGS (FP N).
Other Protective Equipment: SAFETY SHOES.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: SPEC GRAV: (AIR=1 @ 70F (21.1C))=1.00. HNDLG/
STOR PREC: INCREASE DISCHARGE RATE OF PROD FROM CYL. USE A CHECK VALVE/TRAP
IN DISCHARGE LINE TO PVNT HAZ BACK FLOW INTO CYL. CLOSE VALVE AFTER EACH
USE & WHEN EMPTY. PROT CYLS FROM PHYSICAL DMG. STORE IN COOL, DRY, WELL
VENT AREA AWAY FROM HEAVILY TRAFFICKED AREAS & (ING 4)

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Transportation Data
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Disposal Data
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Label Data
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Label Required: YES
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Common Name: 0.35% PENTANE AND 19% OXYGEN IN NITROGEN.
Chronic Hazard: NO
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Fire Hazard-None: X
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Protect Skin: Y
Protect Respiratory: Y
Label Name: LIQUID AIR CORP
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Label City: WALNUT CREEK
Label State: CA
Label Zip Code: 94596
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

=====
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 ASPHYXIAN.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: INHAL:ASPHYXIAN.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.

=====
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)
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Reactivity Data
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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 EMBRITTEMENT @HIGH PRESSURES & TEMPS.
NONE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE
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Health Hazard Data
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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.

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.

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Disposal Data
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Label Data
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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

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
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=====
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. 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

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

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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

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

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).
=====

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

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

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

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

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.

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Health Hazard Data
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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.

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Precautions for Safe Handling and Use
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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
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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.

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.

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Precautions for Safe Handling and Use
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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.

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

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General Information
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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

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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

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

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

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

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
=====

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

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

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

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

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

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

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
=====

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
=====

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.

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
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Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 11OCT95
Safety Data Review Date: 15MAR96
MSDS Serial Number: BZSML

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

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
=====

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
=====

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.

=====
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

=====
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

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
=====

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
=====

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.

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.

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

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

Chronic Exposure: No information found.

Aggravation of Pre-existing Conditions: No information found.

4. First Aid Measures

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes.

Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire: Not expected to be a fire hazard.

Explosion: No information found.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits: None established.

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

Personal Respirators (NIOSH Approved): Not expected to require respirator usage.

Skin Protection: Wear protective gloves and clean body-covering clothing.

Eye Protection: Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

Chronic Exposure: No information found.

Aggravation of Pre-existing Conditions: No information found.

4. First Aid Measures

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes.

Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire: Not expected to be a fire hazard.

Explosion: No information found.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits: None established.

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

Personal Respirators (NIOSH Approved): Not expected to require respirator usage.

Skin Protection: Wear protective gloves and clean body-covering clothing.

Eye Protection: Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	
Australia				
Water (7732-18-5)	Yes	Yes	Yes	Yes
Potassium Acid Phthalate (877-24-7)	Yes	Yes	Yes	Yes
Propylene Glycol (57-55-6)	Yes	Yes	Yes	Yes
FD & C Red No. 40 (25956-17-6)	Yes	Yes	No	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Water (7732-18-5)	Yes	Yes	No	Yes
Potassium Acid Phthalate (877-24-7)	Yes	Yes	No	Yes
Propylene Glycol (57-55-6)	Yes	Yes	No	Yes
FD & C Red No. 40 (25956-17-6)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical
Catg.				
Water (7732-18-5)	No	No	No	No
Potassium Acid Phthalate (877-24-7)	No	No	No	No
Propylene Glycol (57-55-6)	No	No	No	No
FD & C Red No. 40 (25956-17-6)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8(d)
Water (7732-18-5)	No	No	No
Potassium Acid Phthalate (877-24-7)	No	No	No
Propylene Glycol (57-55-6)	No	No	No
FD & C Red No. 40 (25956-17-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: No Chronic: No Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: No information found.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan
Australia			
Water (7732-18-5)	Yes	Yes	Yes
Potassium Acid Phthalate (877-24-7)	Yes	Yes	Yes
Propylene Glycol (57-55-6)	Yes	Yes	Yes
FD & C Red No. 40 (25956-17-6)	Yes	Yes	No

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Water (7732-18-5)	Yes	Yes	No	Yes
Potassium Acid Phthalate (877-24-7)	Yes	Yes	No	Yes
Propylene Glycol (57-55-6)	Yes	Yes	No	Yes
FD & C Red No. 40 (25956-17-6)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical
Water (7732-18-5)	No	No	No	No
Potassium Acid Phthalate (877-24-7)	No	No	No	No
Propylene Glycol (57-55-6)	No	No	No	No
FD & C Red No. 40 (25956-17-6)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Water (7732-18-5)	No	No	No
Potassium Acid Phthalate (877-24-7)	No	No	No
Propylene Glycol (57-55-6)	No	No	No
FD & C Red No. 40 (25956-17-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SARA 311/312: Acute: No Chronic: No Fire: No Pressure: No
 Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: No information found.

Buffer Solution (Phosphate), pH 7 (Color Coded Yellow)

MSDS Number: B5639 --- Effective Date: 02/16/98

1. Product Identification

Synonyms: None

CAS No.: Not applicable to mixtures.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Product Codes: 5656

2. Composition/Information on Ingredients

Ingredient Hazardous	CAS No	Percent	
-----	-----	-----	-----
-			
Potassium Phosphate Monobasic	7778-77-0	98%	No

3. Hazards Identification

Emergency Overview

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None

Flammability Rating: 0 - None

Reactivity Rating: 0 - None

Contact Rating: 1 - Slight

Lab Protective Equip: GOGGLES; LAB COAT

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation: No adverse health effects via inhalation.

Ingestion: Not expected to be a health hazard via ingestion. Large oral doses may cause irritation to the gastrointestinal tract.

Skin Contact: Not expected to be a health hazard from skin exposure. May cause mild irritation and redness.

Eye Contact: No adverse effects expected. May cause mild irritation, possible reddening.

Chronic Exposure, Aggravation of Pre-existing Conditions: No information found.

Buffer Solution (Phosphate), pH 7 (Color Coded Yellow)

MSDS Number: B5639 --- Effective Date: 02/16/98

1. Product Identification

Synonyms: None

CAS No.: Not applicable to mixtures.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Product Codes: 5656

2. Composition/Information on Ingredients

Ingredient Hazardous	CAS No	Percent	
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Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation: No adverse health effects via inhalation.

Ingestion: Not expected to be a health hazard via ingestion. Large oral doses may cause irritation to the gastrointestinal tract.

Skin Contact: Not expected to be a health hazard from skin exposure. May cause mild irritation and redness.

Eye Contact: No adverse effects expected. May cause mild irritation, possible reddening.

Chronic Exposure, Aggravation of Pre-existing Conditions: No information found.

Solubility: Complete (100%)

Specific Gravity: No information found. **pH:** 7.0

% Volatiles by volume @ 21C (70F): ca. 98

Boiling Point, Melting Point, Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg), Evaporation Rate (BuAc=1): No information found.

10. Stability and Reactivity

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Oxides of phosphorous, sodium and carbon may be formed when heated to decomposition.

Hazardous Polymerization: Will not occur.

Incompatibilities, Conditions to Avoid: No information found.

11. Toxicological Information

-----\Cancer Lists\-----

Ingredient Category	---NTP Carcinogen---		IARC
	Known	Anticipated	
Potassium Phosphate Monobasic (7778-77-0)	No	No	None
Sodium Phosphate, Dibasic (7558-79-4)	No	No	None
Propylene Glycol (57-55-6)	No	No	None
FD & C Yellow No. 5 (1934-21-0)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate: No information found.

Environmental Toxicity: No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Solubility: Complete (100%)

Specific Gravity: No information found. **pH:** 7.0

% Volatiles by volume @ 21C (70F): ca. 98

Boiling Point, Melting Point, Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg), Evaporation Rate (BuAc=1): No information found.

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Sodium Phosphate, Dibasic (7558-79-4)	No	No	None
Propylene Glycol (57-55-6)	No	No	None
FD & C Yellow No. 5 (1934-21-0)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate: No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

16. Other Information

NFPA Ratings: Health: 0 Flammability: 0 Reactivity: 0

Label Hazard Warning: As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

Label Precautions: None.

Label First Aid: Not applicable.

Product Use: Laboratory Reagent.

Revision Information: MSDS Section(s) changed since last revision of document include: 3, 4, 5, 6, 7, 10, 16.

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **0**

Label Hazard Warning: As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

Label Precautions: None.

Label First Aid: Not applicable.

Product Use: Laboratory Reagent.

Revision Information: MSDS Section(s) changed since last revision of document include: 3, 4, 5, 6, 7, 10, 16.

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Chronic Exposure: Development of a defatting dermatitis on prolonged contact with potassium hydroxide has been reported. Continued irritation may lead to increased susceptibility to respiratory illness.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems, or impaired kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

First aid procedures given apply to concentrated solutions. Exposures to dilute solutions may not require these extensive first aid procedures.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion: If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire: Not considered to be a fire hazard.

Explosion: Sealed containers may rupture when heated.

Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Store in a cool, dry, ventilated area. Protect against physical damage. Separate from acids and alkalis. Protect from freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Chronic Exposure: Development of a defatting dermatitis on prolonged contact with potassium hydroxide has been reported. Continued irritation may lead to increased susceptibility to respiratory illness.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems, or impaired kidney or respiratory function may be more susceptible to the effects of the substance.

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11. Toxicological Information

For potassium hydroxide: Oral rat LD50: 273 mg/kg; Investigated as a mutagen. Skin Irritation Data (std Draize, 50 mg/24 H): Human, Severe; Rabbit, Severe. Eye Irritation Data(Rabbit, non-std test,1 mg/24 H, rinse): Moderate.

-----\Cancer Lists\-----

Ingredient Category	---NTP Carcinogen---		IARC
	Known	Anticipated	
Water (7732-18-5)	No	No	None
Boric Acid (10043-35-3)	No	No	None
Potassium Hydroxide (1310-58-3)	No	No	None
C.I. Acid Blue 9 Disodium Salt (3844-45-9)	No	No	3
Citric Acid (77-92-9)	No	No	None
Sodium Benzoate (532-32-1)	No	No	None
Propylene Glycol (57-55-6)	No	No	None
FD & C Red No. 40 (25956-17-6)	No	No	None
Propyl Paraben (94-13-3)	No	No	None

12. Ecological Information

Environmental Fate: No information found.

Environmental Toxicity: Potassium Hydroxide: TLm: 80 ppm/Mosquito fish/ 24 hr./ Fresh water

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan
Australia			

11. Toxicological Information

For potassium hydroxide: Oral rat LD50: 273 mg/kg; Investigated as a mutagen. Skin Irritation Data (std Draize, 50 mg/24 H): Human, Severe; Rabbit, Severe. Eye Irritation Data(Rabbit, non-std test,1 mg/24 H, rinse): Moderate.

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C.I. Acid Blue 9 Disodium Salt (3844-45-9)	No	No	3
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14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan
Australia			

FD & C Red No. 40 (25956-17-6)
Propyl Paraben (94-13-3)

No No No
No No No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS: This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0

Label Hazard Warning: DANGER! CORROSIVE. HARMFUL IF SWALLOWED OR INHALED. CAUSES BURNS TO ANY AREA OF CONTACT.

Label Precautions: Do not breathe mist. Do not get in eyes, skin, or on clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid: If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use: Laboratory Reagent.

Revision Information: MSDS Section(s) changed since last revision of document include: 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 16.

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FD & C Red No. 40 (25956-17-6)
Propyl Paraben (94-13-3)

No No No
No No No

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SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: None allocated.

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Product Use: Laboratory Reagent.

Revision Information: MSDS Section(s) changed since last revision of document include: 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 16.

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GEORGIA STEEL & CHEMICAL -- FK300 SPECIAL RESPIRATOR CLEANER PLUS -
QUATERNARY AMMONIUM GERMICIDAL DETERGENT DISINFECTANT
MATERIAL SAFETY DATA SHEET
NSN: 685000F046838
Manufacturer's CAGE: 3J051
Part No. Indicator: A
Part Number/Trade Name: FK300 SPECIAL RESPIRATOR CLEANER PLUS

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

Item Name: QUATERNARY AMMONIUM GERMICIDAL DETERGENT DISINFECTANT
Company's Name: GEORGIA STEEL & CHEMICAL CO INC
Company's Street: 10810 GUILFORD RD BAY 104
Company's City: ANNAPOLIS JUNCTION
Company's State: MD
Company's Country: US
Company's Zip Code: 20701-5000
Company's Emerg Ph #: 301-317-5502/800-296-0351
Company's Info Ph #: 800-296-0351/301-317-5502
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 01JAN96
Safety Data Review Date: 31MAY96
Preparer's Company: GEORGIA STEEL & CHEMICAL CO INC
Preparer's St Or P. O. Box: 10810 GUILFORD RD BAY 104
Preparer's City: ANNAPOLIS JUNCTION
Preparer's State: MD
Preparer's Zip Code: 20701-5000
MSDS Serial Number: BYNPW

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

Proprietary: NO
Ingredient: QUATERNARY AMMONIUM COMPOUNDS, BENZYL-C12-18-ALKYLDIMETHYL,
CHLORIDES *96-1*
Ingredient Sequence Number: 01
Percent: 5-10
NIOSH (RTECS) Number: 1001813QA
CAS Number: 68391-01-5

Proprietary: NO
Ingredient: OCTYL DECYL DIMETHYL AMMONIUM CHLORIDE; N,N-DIMETHYL-N-OCTYL-
1-DECANAMINIUM CHLORIDE; AMMONIUM, DECYLDIMETHYLOCTYL
Ingredient Sequence Number: 02
Percent: 1-5
NIOSH (RTECS) Number: HD6520000
CAS Number: 32426-11-2

Proprietary: NO
Ingredient: DIDECYL DIMETHYL AMMONIUM CHLORIDE; DIMETHYLDIDECYLAMMONIUM
CHLORIDE; BTC 1010; BARDAC 22
Ingredient Sequence Number: 03
Percent: 1-5
NIOSH (RTECS) Number: BP6560000
CAS Number: 7173-51-5

Proprietary: NO
Ingredient: DIDECYL DIMETHYL AMMONIUM CHLORIDE
Ingredient Sequence Number: 04
Percent: 1-5
NIOSH (RTECS) Number: RG8250000
CAS Number: 5538-94-3

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

Appearance And Odor: CLEAR BLUE LIQUID W/A PLEASANT SASSAFRAS ODOR.
Boiling Point: 212F
Vapor Pressure (MM Hg/70 F): AS WATER
Specific Gravity: 1.01
Evaporation Rate And Ref: (WATER =1): 1
Solubility In Water: COMPLETE
=====

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

Flash Point: NONE TO BOILING
Flash Point Method: TCC
Special Fire Fighting Proc: NONE
Unusual Fire And Expl Hazrds: NONE
=====

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

Stability: YES
Cond To Avoid (Stability): DON'T MIX W/CLEANING CHEMICALS.
Materials To Avoid: STRONG OXIDIZING/REDUCING AGENTS.
Hazardous Decomp Products: AMMONIA, NITROGEN OXIDES.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE
=====

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

Route Of Entry - Inhalation: NO
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
IRRITATION TO MUCOUS MEMBRANES. INGESTION: SEVERE IRRITATION TO MOUTH,
THROAT, GI TRACT, CIRCULATORY SHOCK & RESPIRATORY DEPRESSION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NONE
Signs/Symptoms Of Overexp: REDNESS, TEARING, IRRITATION, BURNING IN MOUTH,
THROAT, ABDOMEN, CIRCULATORY SHOCK, CONVULSIONS.
Med Cond Aggravated By Exp: DERMATITIS.
REMOVE TO FRESH AIR. SKIN: WASH W/MILD SOAP & WATER. OBTAIN MEDICAL
ATTENTION IN ALL CASES. INGESTION: DON'T INDUCE VOMITING. GIVE PROMPTLY
LARGE QUANTITIES OF EGG WHITES/GELATIN SOLUTION. IF UNAVAILABLE, DRINK
LARGE QUANTITIES OF WATER. AVOID ALCOHOL. OBTAIN MEDICAL ATTENTION IN ALL
CASES. NOTE TO PHYSICIAN: (SEE SUPP)
=====

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

Steps If Matl Released/Spill: MOP UP/ABSORB/USE SOLID ABSORBENT & SHOVEL
INTO CONTAINERS FOR DISPOSAL.
Waste Disposal Method: DISPOSE OF IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Precautions-Handling/Storing: KEEP CONTAINER CLOSED WHEN NOT IN USE. DON'T REUSE EMPTY CONTAINER.
Other Precautions: KEEP AWAY FROM FOOD & WATER SUPPLIES. OPEN DUMPING IS PROHIBITED.

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

Ventilation: MECHANICAL (GENERAL) IS SUFFICIENT
Protective Gloves: RUBBER/NEOPRENE
Eye Protection: GOGGLES
Other Protective Equipment: NONE
=====

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

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

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

Label Required: YES
Label Status: G
Common Name: FK300 SPECIAL RESPIRATOR CLEANER
MAY CAUSE IRRITATION OF LUNGS & AIRWAYS. IRRITATION, STOMACH DISTRESS.
Label Name: GEORGIA STEEL & CHEMICAL CO INC
Label Street: 10810 GUILFORD RD BAY 104
Label City: ANNAPOLIS JUNCTION
Label State: MD
Label Zip Code: 20701-5000
Label Country: US
Label Emergency Number: 301-317-5502/800-296-0351

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 Memphis Project No.: _____

Location: Millington, TN Project Manager: Matt Haupt

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
- 2. Material safety data sheets (MSDSs):
 - a. MSDSs on file
 - b. Log assigned to competent person
 - c. Log complete and up to date
- 3. Written program on file

III. EMPLOYEE TRAINING

- 1. Site personnel have read the job safety rules and regulations and have signed the "Employee Signoff Sheet"
- 2. Sufficient instruction given in recognition and avoidance of job hazards; unsafe conditions; and job rules, regulations, and procedures
- 3. Sufficient instruction in proper use and maintenance of tools, equipment, and personal protective equipment
- 4. Employees instructed to report unsafe or hazardous conditions to proper job supervisor
- 5. Employees instructed to promptly report injury, illness, and accidents involving damage to equipment and materials
- 6. Safety indoctrination held for new employees

IV. JOBSITE LOGISTICS AND LAYOUT

- 1. Traffic routes around construction areas:
 - a. Warning signs, flagging in place
 - b. Crane swing flagged
- 2. Utility ditches:
 - a. Flagged or barricaded
- 3. Trucks and heavy equipment:
 - a. Good mechanical conditions
 - b. Backup signals working
 - c. Seat belts installed and used
- 4. Motor graders and other earth movers:
 - a. Good mechanical conditions
 - b. Backup signals working
 - c. Seat belts installed and used

V. PUBLIC PROTECTION

- 1. Warning signs in place around site
- 2. After-hours hazards:
 - a. Open ditches protected

- b. Drop-offs protected
- c. Ladders lowered
- 3. Hazard lights

VI. HOUSEKEEPING

- 1. Material storage yard:
 - a. Stacked neatly and properly
 - b. Aisles, walkways, roads clear
- 2. Check work areas for:
 - a. Loose and waste materials
 - b. Vicinity of ladders, stairs, ramps, and machinery
 - c. Empty bottles, containers, papers, trash, bands, brick-bats, etc.
 - d. Trash cans, dumpsters available and emptied regularly
 - e. Nails, boards, debris removed
 - f. Trash receptacles provided for drinking cups

VII. PERSONAL PROTECTIVE EQUIPMENT (PPE)

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

d. Tools maintained in functional condition

VIII. SANITATION

1. Temporary toilets:

a. Serviced regularly

b. Sufficient Quantity (20 or fewer employees - 1 required;
20 or more employees - 1 toilet and 1 urinal per 40 workers)

2. Potable Water:

a. Tightly closed containers

b. Equipped with tap

c. Paper cups available

d. Containers labeled "Drinking Water"

IX. FLOOR AND WALL OPENINGS GUARDS

1. All floor openings with a drop of more than 4 feet covered or guarded by standard railing and toe board

2. Wall openings with a drop of more than 4 feet guarded as required

3. Open-sided floors, walkways, platforms, ramps, and runways with a drop of more than 4 to 6 feet guarded with standard railing and toe-board as required

4. All stairs with four or more risers provided with railings

5. Railing, posts, and wall opening barriers able to withstand force of at least 200 pounds

6. Screens used between the board top rail where needed to prevent material from falling.

7. Floor coverings built to withstand two times the intended load.

XI. SCAFFOLDING

1. Erected under proper supervision

2. All structural members adequate for use

3. All connections adequate, pins, crossbracing provided and support

4. Proper footings provided (sound, rigid, and secured)

5. Safely tied into structure

6. Access ladder or safe equivalent provided and used

7. Defective and damaged parts, planks, etc., removed from service

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 8. Ladders and working areas kept free of debris, ice, snow, chemicals, and grease | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Complete platform, planks, close together and overlapped by at least 12 inches or secured by wire or proper cleating | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Guard rails, mid-rails, and toe boards installed on all open sides of platforms 10 feet and over in height (applies to both maintenance and construction) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Frequent inspections made | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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

XIII. TEMPORARY HEATERS

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Equipped with pilot and automatic shutoff valve to prevent flow of fuel if flame goes out or the unit is tipped over | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Installed, serviced, and relocated only by authorized employees | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Frequently checked to ascertain safe conditions and clearance from combustible and flammable material | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Sufficiently ventilated | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XIV. FIRE PROTECTION

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

XV. MATERIAL STORAGE AND HANDLING

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Neat storage area, clear passageways | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Materials spotted to minimize rehandling and reduce transport distances | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Power equipment used to handle heavy/awkward loads | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 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

XVI. DEMOLITION WORK

1. Operations planned ahead and checked for lead and asbestos if applicable
2. Safety work permit required and necessary blinding of lines, etc., accomplished
3. Adjacent structures shored or braced
4. Electrical, water, sewer, steam lines cut off, locked out, or tagged
5. Area roped off or barricaded
6. Proper safety, danger, and warning signs provided and used
7. Adequate lighting and ventilation provided where necessary
8. Material chutes used
9. Adequate safe access provided
10. Clear operating space provided for equipment and vehicles
11. Overhead protection provided where required
12. Proper fire extinguishing equipment in place
13. Full clothing, serviceable shoes, and adequate PPE (hard hats, goggles, gloves, safety belts, respirators, ear plugs or muffs, etc.) provided
14. Safe housekeeping, welding, rigging, and scaffolding practices observed
15. Regular supervision maintained

XVII. STEEL ERECTION

1. Safety nets used, if required
2. Hard hats, eye protection, safety belts, serviceable shoes, gloves, and full clothing used
3. Tag lines used for hoisting tools and material
4. Fire hazards checked at rivet force and welding operations
5. Ladders, stairs, or other safe access provided
6. Hoisting apparatus checked

7. Good housekeeping, welding, and rigging practices observed

XX. FLAMMABLE AND COMBUSTIBLE LIQUIDS

- 1. Containers clearly marked to show contents (gas cylinders, cans, etc.)
- 2. Proper storage practices observed:
 - a. Storage areas enclosed or protected from heat and mobile equipment exposure
 - b. Fire hazards checked
 - c. Sufficient fire extinguishers
 - d. UL approved safety cans for 1 to 5 gallons of flammable liquids
 - e. Approved cabinet for indoor storage of liquids in excess of 25-gallons, but not more than 120-gallon storage
 - f. Sign labeled "Flammable - Keep Fire Away" posted on cabinet
- 3. Drums and tanks used for outdoor dispensing and fueling purposes:
 - a. Located 25 feet from buildings and work areas
 - b. Bonded, grounded, and equipped with self-venting bungs and self-closing faucets
 - c. Identified and restricted from smoking or other heat sources; "No Smoking" signs posted
 - d. Diked and drainage provided for spills
 - e. Engines of vehicles or other combustion equipment shut off when being fueled.
 - f. Protected from traffic and kept free of weeds, debris, etc.

XXI. FLAMMABLE GAS (Oxygen/Acetylene)

- 1. Cylinders:
 - a. Away from heat
 - b. Stored upright (secured)
 - c. Valves closed on empty cylinders
 - d. Valve protection caps in place if cylinder not in use
 - e. Valve key wrench available
 - f. Portable rack with bottles secured
 - g. Instruct project staff to never drag or slide bottles
 - h. Designated storage area
 - i. Oxygen bottles stored 20' from acetylene bottles or 1/2-hour fire

- barrier installed between them
- j. "No Smoking" signs posted
- 2. Gauges/valves/hoses:
 - a. Good condition
 - b. Fire arresters installed (both hoses)
- 3. Eye protection available
- 4. All burning torches bled and free of oxygen and acetylene and/or other gases during lunch breaks and other extended periods of time
- 5. When in use, gas lines properly located to prevent tripping and falling
- 6. Ventilation adequate

XXII. WELDING OPERATIONS

- 1. Performed by qualified personnel
- 2. Screens, shields, or eye protection provided and used to protect employees from welding operation
- 3. Employees wear sufficient clothing and PPE
- 4. Equipment checked before use and in operative conditions
- 5. Electrical equipment grounded
- 6. Power cables protected and in good repair
- 7. Power cables properly located to prevent tripping and falling hazards
- 8. Dry chemical fire extinguisher within 30 feet
- 9. Exposed combustible materials removed to safe location or properly protected from sparks and slag
- 10. Valid hot work permit required or provided
- 11. Machines turned off at end of shift or when not in use for extended periods
- 12. "Danger - No Smoking, Matches or Open Lights" signs posted when required
- 13. Overhead protection provided where required

XXIII. HOISTS

- 1. Material hoists:
 - a. Designed by licensed professional engineer
 - 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				
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 checked="" 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"/>
2.	Personnel hoists:				
a.	Hoisting doors at least 6 feet, 6 inches high with vision panel of solid construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Machinery and control equipment lighting and protection from weather	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c.	Double-planked stock overhead protection for operator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Operator on duty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	Electrically released, spring or weight-applied brake in working	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f.	Not used to carry personnel until inspected and tested Solid construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g.	Hoist thoroughly inspected each day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<hr/>					
XXIV. BLASTING					
1.	Qualifications and credentials checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Jobsite meeting held	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	All signs, warning signals, PPE in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Non-essentials removed from area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Radio transmissions limited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Blasting mats in place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7. Blasting log maintained

XXV. HAZARDOUS WASTE

Certification and Training of CH2M HILL Personnel

1. Medical exam within last 12 months

2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher

3. First aid and CPR certification

4. Quantitatively fit tested (preferred method per NIOSH Publication 87-116, 87-116, Appendix B.3)

5. Attend pre-entry safety meeting

6. Safety Coordinator with appropriate training

Certification and Training of Subcontractor Personnel

1. Medical exam within last 12 months

2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher

3. First aid and CPR certification

4. Quantitatively fit tested (preferred method per NIOSH Publication 87-116, (Appendix B.3)

5. Attend pre-entry safety meeting

Site Safety Documentation

1. Site health and safety plan (HSP) prepared and approved

2. HSP onsite

3. All personnel onsite identified in HSP

4. Documentation of safety briefing

5. Hospital map posted

6. Phone numbers posted

7. Emergency vehicle identified

8. Material Safety Data Sheets (MSDSs) onsite

9. Work zones delineated (How? _____)

10. Wind direction flags in use

11. Documentation of calibration of monitoring equipment in Clean environment

12. Monitoring conducted and recorded as specified in HSP (Frequency? _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 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"/>
<u>Safety Briefing</u>				
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 checked="" 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Work zones reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Decontamination procedures reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Emergency response procedures reviewed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Site communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Personal Protective Equipment (PPE)</u>				
1. Levels of protection being worn as specified in HSP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. All appropriate PPE available onsite	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Hard hats being worn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Appropriate hand protection being used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- (What? _____)
5. Appropriate body protection being used
(What? _____)
6. Appropriate eye protection being used
(What? _____)
7. Appropriate ear protection being used
8. Appropriate respirator protection being used
9. Respirators donned correctly
10. TLD badges being used
11. If air purifying respirators (APRs) are being used, correct cartridges
(Type? _____)
12. If self contained breathing apparatuses (SCBAs) are being used, is grade
D air being used
13. If SCBAs are being used, are cylinders stored correctly
14. If PPE is not onsite, prepared to halt work
15. 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
(How? _____)
6. Heavy equipment properly decontaminated
(How? _____)
7. Samples properly decontaminated
(How? _____)
8. Decontamination fluids appropriately disposed of

XXVI. CONSTRUCTION INSPECTIONS

1. Are the following inspected frequently:

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| a. Jobsite | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Materials | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. When asbestos is present, is the enclosure inspected by a competent person before removal prior to each work shift? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. When noise levels are suspected to exceed 85 db(A) is noise monitoring conducted? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. When exposure limits for gases, vapors, fumes, and/or mists might be exceeded, is monitoring conducted? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. First aid kits inspected before being sent to a jobsite and weekly | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. When methylenedianiline is present are the following done? | | | | |
| a. Initially monitoring | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Monitoring every 6 months | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Monitoring when changes in potential exposure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Work clothing inspected periodically | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Spills and leak inspections conducted regularly | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. When onsite, are respirators inspected regularly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. When working near or over water, are buoyant work vests and preservers inspected regularly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Is all fire fighting equipment, including portable fire extinguishers periodically inspected? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Is rigging equipment inspected prior to each use and as necessary? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Are abrasive wheels inspected and ring tested before mounting? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Are joints in structures and pipelines used as ground return circuits Bonded/inspected periodically? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Is each cord set; attachment cap, plug, and receptacle of cord sets; and Equipment connected by plug inspected for electrical grounding before each day's use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Are lockout/tagout procedures in place whenever equipment is being Repaired or maintained? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Are single point suspended scaffolds type hoists, cables, and related equipment regularly serviced and inspected? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Are cranes and derricks inspected by a competent person prior to each use and during use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Is hoisting machinery for cranes and derricks inspected annually? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 18. Are trial lift of personnel baskets visually inspected by a competent Person immediately after a trial lift? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Are hoists inspected and tested at not more than 3-month intervals? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Are hoist towers inspected and maintained on a weekly basis? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Before moving, are booms on aerial lifts inspected, properly cradled, and Outriggers stowed? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Are excavation inspected by a competent person after every rainstorm or Hazard-increasing occurrence? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Are excavations inspected daily by a competent person? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Are roof face and walls of tunnels inspected at the start of each shift and Frequently thereafter? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Does a competent person inspect all drilling and associated equipment Prior to blasting? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Prior to blasting, are drilling areas inspected? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. During demolition, are stairs, passage ways, and ladders periodically inspected? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Are electrical systems of vehicles transporting explosive Underground checked weekly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Are electrical transmission and distribution equipment inspected prior to starting work? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Are lockout/tagout designated switched and disconnectors visually Inspected and tested prior to operation? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. When working on energized lines, is rubber protective equipment Visually inspected prior to use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Are body belts and straps inspected before use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Are live line tools visually inspected before each work day? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Are ladders inspected periodically and after any occurrence which could affect their safety? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Are inspections of overhead lines made prior to climbing to determine that structures are capable of sustaining additional stresses? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Is power transmission equipment visually inspected daily? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- available to affected employees?
4. Are signs concerning exits, room capacities, floor loading, exposure to x-ray, microwave, or other harmful radiation or substances posted appropriately?
5. Are other required posters properly displayed, such as:
- a. Industrial Welfare Commission orders regulating wages, hours, and working conditions?
- b. Discrimination in employment prohibited by law?
- c. Notice to employees of unemployment and disability insurance.
- d. Payday notice?

Emergency Action Plan

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

Fire Protection

1. Is there a current fire prevention plan?
2. Does the plan describe the type of fire protection equipment and/or
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 the minimum number of toilets and washing facilities provided?
5. Are all toilets and washing facilities clean and sanitary?
6. Are all work areas adequately illuminated?

Walkways

1. Are aisles and passageways kept clear?
2. Are aisles and walkways marked as appropriate?
3. Are holes in the floor, sidewalk, or other walking surface repaired Properly, covered, or otherwise made safe?
4. Are wet surfaces covered with nonslip materials?

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

Confined Space Evaluation

1. Personnel informed of location and hazards of existing confined-space (danger signs, verbal).

- 2. Determination made that work can not be completed without entering the confined space.
- 3. Information obtained regarding the space (blue prints, potential hazards, energy sources).
- 4. Spaces classified as permit-required, alternative procedures, or non-permit confined space.

Training

- 5. Entrants, Attendants, and Entry Supervisor have completed confined-space entry training.
- 6. Employees performing lockout/tagout procedures have completed LOTO training.
- 7. Employees required to wear respirators have completed respiratory Protection training.

Confined-Space Entry

- 8. Complete permit or certificate posted at space entrance.
- 9. Pre-entry briefing conducted.
- 10. Entrants/Attendants verify that entry supervisor has authorized entry.
- 11. Entrants/Attendants verify that all requirements of the permit or certificate have been satisfied.
- 12. Atmospheric monitoring is conducted at frequency provided on the permit or certificate.
- 13. Entry not permitted if an atmospheric hazard is detected above acceptable safe levels.
- 14. Entrants evacuate space upon orders of the attendant or entry supervisor when an alarm is sounded, or when a prohibited condition is recognized.
- 15. Entrants/Attendant informs entry supervisor of hazards confronted or created in the space or any problems encountered during entry.
- 16. Entry supervisor informs the owner of such issues in item 15 above.
- Entry Under A Confined-Space Entry Permit (CESP) (6.4)**
- 17. CSEP completed by entry supervisor.
- 18. All expected hazards listed.
- 19. Entry supervisor and Attendant assigned.
- 20. Communication methods established between entrants and the Attendant. (6.7.1)
- 21. Cleaning requirements identified. (6.7.2)
- 22. Isolation requirements identified. (6.7.3)
- 23. Ventilation requirements identified. (6.7.4)
- 24. Protective equipment requirements identified. (6.7.5)

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 25. Rescue equipment requirements identified. (6.7.6) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Other requirements identified. (6.7.7) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Rescue and emergency procedures identified. (6.8) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Atmospheric monitoring requirements identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. HS&E manager approve use by signing (CH2M HILL CSEP ONLY) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Entry supervisor authorized entry by signing CSEP. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Authorized entrants have completed CSE training and attendant pre-entry briefing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Only authorized entrants permitted to enter the space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Entry supervisor sign the CSEP indicating its cancellation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Problems encountered during the entry listed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Entry Under An Alternative Procedure Certificate (APC) (6.5) | | | | |
| 35. APC completed by entry supervisor. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. All expected hazards listed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Entry supervisor and attendant assigned. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Entry supervisor verifies that non-atmospheric hazards do not exist. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Communication methods established between entrants and attendants. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Covers removed safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Openings guarded from both fall hazards and from objects entering the space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Continuous forced-air ventilation positioned to ventilate the immediate areas where employees are working and continue until they leave the space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Ventilation from a clean source of air. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Atmospheric monitoring requirements identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Entry supervisor authorized entry by signature. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Authorized entrants have completed CSE training and attended pre-entry briefing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Only authorized entrants permitted to enter the space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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| 48. Entry supervisor sign the APC indicating its cancellation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Problems encountered during the entry listed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Entry Under a Non-Permit Certificate (NPC) (6.6) | | | | |
| 50. NPC completed by entry supervisor. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Entry supervisor assigned. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Attendant or buddy assigned. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Buddy remains in the space with the entrant. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Entry supervisor verifies non-atmospheric hazards do not exist. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. Communication methods established between entrants and attendant or buddy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Entrants informed to exit the space immediately if hazards are observed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Atmospheric monitoring requirements identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Entry supervisor authorizes entry by signing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Authorized entrants have completed CSE training and attended pre-entry briefing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Only authorized entrants permitted to enter the space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Entry supervisor will sign the NPC indicating its cancellation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Problems encountered during entry listed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Rescue (6.8) | | | | |
| 63. Entrants wearing body harness with attached retrieval line. (lifeline) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. End of lifeline attached to retrieval device (when required) or fixed point outside space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Mechanical retrieval device positioned at access point for vertical-type spaces >5 feet deep. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Rescue team established. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. Team members have completed confined-space entry training. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Team members informed of the hazards that they may confront during rescue operations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. PPE & rescue equipment necessary to conduct safe entry-rescue provided and readily available. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. Team members trained on rescue duties and proper use of PPE and rescue equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. All team members trained in First Aid and CPR, at least one member | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

holding a current certificate.

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| 72. Team has made simulated rescue from a space of similar configuration within last 12 months. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. Communications established & tested between team & entrants, and emergency provider. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 74. Local emergency medical provider notified in advance PRCS entry. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Atmospheric Monitoring | | | | |
| 75. Qualified individual conducts atmospheric monitoring. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 76. Monitoring results documented on permit or certificate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 77. Entrants do not enter until all monitoring requirements are completed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 78. Monitoring equipment calibrated prior to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 79. Monitoring conducted for oxygen, flammability, and toxic air contaminants. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 80. Monitoring conducted bottom to top at five foot intervals. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Pre-entry Briefing | | | | |
| 81. Entry supervisor conducts the briefing and discusses the following: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 82. Explanation of work to be performed and limitations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 83. Explanation of actual and potential hazards, including the possible behavioral effects and signs, symptoms, and consequences of exposure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 84. Review control measures & atmospheric monitoring requirements, as Specified on permit or certificate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 85. Review of entrant and attendant responsibilities. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXIX. STAIRWAYS AND LADDERS

Personnel Safe Work Practices (3.1)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Employees have completed stairway and ladder training. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Carrying objects on stairs with both hands is avoided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Pan and skeleton metal stairs not used until permanent or temporary treads/landings provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Ladders periodically inspected for defects by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Defective ladders tagged and removed from service until repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Ladders used only for purpose for which they were designed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Ladders not loaded beyond their rated capacity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Only one person simultaneously climbing or working from an individual ladder. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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| 9. Personnel face ladder when climbing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Personnel climbing ladders maintain 3 points of contact with ladder. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Personnel not carrying tools, materials, or equipment while climbing.
Tag lines used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Ladders not moved, shifted or extended while in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Stepladders used in open and locked position only. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Stepladders top platform and top step not used as a step. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Stepladders cross-braced not used for climbing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Fall protection considered when working from ladders over 6'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Stairways and Ladders General (3.2.1)</u> | | | | |
| 17. Stairways or ladders provided at breaks in elevation \geq 19 inches. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. At least one clear access point provided to elevated levels. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Stairway: Design and Construction (3.2.2)</u> | | | | |
| 19. Stairways maintained free of slippery conditions and dangerous projections. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Stairways installed between 30-50 degrees with uniform risers and treads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Landings (30" deep X 22" wide) provided every 12' of vertical rise. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Landings extend \geq 20" beyond swing of any doors. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Adequate stair rails installed at each unprotected side or edge.. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Handrails installed as handhold for support | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Mid-rails, screens, mesh, or intermediate members installed between top rail and treads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Adequate guardrail installed at each unprotected side or edge of landing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Ladders:: General (3.2.3)</u> | | | | |
| 27. Ladder components surfaced to prevent injury from puncture, laceration, or snagging clothing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Ladders maintained free of oil, grease, and other slipping hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Area around top and bottom of ladders kept free of obstructions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Portable Ladders: Design and Construction (3.2.4)</u> | | | | |
| 30. Only American National Standards Institute (ANSI) approved ladders. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Rungs and steps are parallel, level, and uniformly spread. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Ladders not tied or fastened together to created longer sections unless | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- designed for such use.
- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 33. Ladders with non-conductive side rails used near energized electrical equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Extension ladders equipped with positive section stops. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Stepladders provided with metal spreader or locking device to hold open when in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Two or more ladders used to reach elevated work areas offset with platform or landing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Double-cleated or two ladders provided if > 25 personnel use ladders as <u>only means of access, or when ladder serves simultaneous two-way traffic.</u> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Wood ladders not coated with opaque covering. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Portable Ladder: Positioning</u> | | | | |
| 39. Ladders used only on stable, level, surfaces unless secured to prevent movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Ladders placed in areas where they can be displaced by work activities, secured or barricaded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Extension ladder section overlap adequate distance. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Extension and straight ladders placed with both side rails supported equally. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Extension & straight ladders positioned at approximately 75° angle. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Ladders extend 3' above upper landings or are secured at top. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Fixed Ladders: Design and Construction</u> | | | | |
| 45. Adequate clearances from obstructions maintained behind, in front, and to the side of the ladder rungs. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Ladder step across distance at access point 7-12". | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Side rails extend 42" above landing platform. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Cages, wells, ladder safety devices, or self-retracting lifelines used for Ladders > 24' | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Ladder safety devices operate without the use of hands. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Ladder safety devices activate with 2' after a fall. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Connection between lifeline and harness attachment point ≤ 9" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXX. FALL PROTECTION

Personnel Safe Work Practices (3.1)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Employees have completed initial fall protection training. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Project Fall Protection Form completed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Employees have completed project-specific fall protection training. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| 4. Fall protection systems used to eliminate construction fall hazards $\geq 6'$. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. Fall protection systems used to eliminate general industry fall hazards $\geq 4'$ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 6. Personnel aware of and follow requirements established by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel fall arrest systems (PFAS) inspected prior to each use for defects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Fall protection systems constructed and used according to requirements listed below. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Personnel remaining within guardrails, when provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Guardrails (3.2.2)</u> | | | | |
| 10. Top rails positioned 39-45" above the walking/working level. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Mid-rails, screen, or other barrier between the top rail and the walking working surface. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Wood construction: 2"X4" top rails, 1"X6" mid-rails, and 2"X4" posts spaced every 8'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Pipe construction: 1 1/2" nominal diameter with posts spaced every 8'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Structural steel construction: 2"X2"X3/8" angles with post every 8'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Other construction: pass a 200 lb. load test, no deflection to < 39" from the base of the deck. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 16. Natural or synthetic rope top rails/mid-rails inspected frequently and pass 200 lb. load test. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 17. Wire rope top/mid-rails $\geq 1/4'$ nominal diameter and flagged every 6'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Points of access (ladderways) provided with gate or offset. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Safety Nets (3.2.3)</u> | | | | |
| 19. Nets installed as close as practical under the walking/working surface, < 30' | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Potential fall area from bridge surfaces to net unobstructed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Nets extend outward from the work surface based on the vertical fall Distance, 8' to 13'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Net pass drop test or competent person certifies nets are in compliance. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Nets installed with sufficient clearance underneath to prevent contact with a surface. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Nets inspected at least once a week and after any occurrence that Could affect its integrity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Objects in net removed as soon as possible, at least before the next shift. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Mesh openings $\leq 6''$ in length on any side. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Safety net panel connections as strong as integral net components and | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

spaced $\geq 6''$ apart.

28. Border ropes have a minimum breaking strength of 5,000 pounds.

Personal Fall Arrest Systems (3.2.4)

29. PFAS components meet or exceed OSHA strength criteria.

30. PFAS rigged such that personnel can neither free-fall more than 6', nor contact any lower level.

31. Only locking type snaphooks are used.

32. Body harness back dee-ring used as attachment point.

33. Horizontal lifelines used under supervision of qualified person with safety factor of ≥ 2 .

34. When vertical lifelines are used, each employee attached to a separate lifeline.

35. PFAS anchorages capable of supporting $\geq 5,000$ lbs. per person or used under the supervision of qualified person, with safety factor of ≥ 2 .

36. PFAS anchorages independent of anchorages used to support or suspend platforms.

37. PFAS components used only for fall protection and not to hoist materials.

38. PFAS components subjected to impact loading immediately removed from service.

39. PFAS can not be attached to guardrail systems or hoist.

40. Method of rescue provided in the event of a fall.

Positioning Devices (3.2.5)

41. Components meet or exceed OSHA PFAS construction and strength criteria.

42. Components inspected prior to each use and defective components removed from service.

43. Positioning devices rigged such that personnel cannot free-fall more than 2'.

44. Anchorages capable of supporting ≥ 2 times potential impact load of fall or minimum of 3,000 pounds.

Warning Lines (3.2.6)

45. Warning lines erected around all sides of roof work area.

46. Mechanical equipment used, warning line erected 6' from parallel roof Surface and 10' from perpendicular roof surface to the direction of Operation of the mechanical equipment.

47. Warning lines 34"-39" above the walking/working surface.

48. Warning lines flagged at $\leq 6'$ intervals with high-visibility material.

49. Warning lines attached at stanchions capable of resisting 16 lb. force without tipping.

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|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 50. Only personnel performing roof work allowed between roof edge and warning line. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Warning line placed across the access points when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Controlled Access Zone (3.2.7)</u> | | | | |
| 52. Control lines enclose control access zones. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Only personnel engaged in related work permitted in controlled access zone. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Control lines 30-45' from the walking/working surface. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. Control lines flagged at $\geq 6'$ intervals with high-visibility material. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Precast concrete control lines positioned 6-60' or half the length of the erected member. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Leading edge control lines positioned 6-25' from leading edge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Overhand bricklaying control lines positioned 10-15' from working edge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Safety Monitoring System (3.2.8)</u> | | | | |
| 59. Safety monitor designated to observe and warn personnel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Safety monitor not distracted from the monitoring function. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Safety monitor on the same working surface within sight and voice communication. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Only personnel necessary for work in safety monitoring zone. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Personnel adhere to the safety monitors instructions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Fall Protection Plan (3.2.9)</u> | | | | |
| 64. Plan prepared by qualified person and specifically for site work being performed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Plan maintained current with changes approved by a qualified person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Plan maintained at the job site and implemented by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. Plan documents why fall protection systems are infeasible or would create a greater hazard. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Plan discusses measures taken to reduce or eliminate the fall hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. Plan discusses when scaffolds, ladders, or vehicle mounted work platforms will be used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. Locations cover by plan identified and classified as controlled access zones. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. Safety monitoring system used when no other alternative measure implemented. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. Entry into controlled access zone limited to personnel designated in plan. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Covers (3.2.10)</u> | | | | |
| 73. Covers capable of supporting 2X the maximum weight imposed on the | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- cover at any one time.
74. Covers secured to prevent accidental displacement.
75. Covers color coded or marked "Hole" or "Cover".
- Falling Object Protection**
76. Personnel exposed to falling objects wearing hard hats.
77. Canopies, when used, strong enough to prevent collapse and Penetration by falling objects.
78. Toeboards, screens, guardrails, or canopies used or area barricaded below.
79. Toeboards, when used, erected along the edge of the overhead walking/ working surface.
80. Toeboards 3 1/2" high, ≤1/4" clearance above the surface, and no openings >1".
81. Screening/paneling provided where equipment or materials are piled above toeboards..
82. Guardrails, when used, on openings small enough to prevent passage of falling objects.
83. Overhand bricklaying masonry/mortar no stored within 4" of working edge.
84. Overhand bricklaying excess mortar, masonry units, and other debris kept clear of edge.
85. Roofing materials not stored within 6' of roof edge, unless guradrails are provided.
86. Roofing materials that are positioned near roof edge are stable and self-supporting.
87. Objects on elevated surfaces positioned away from surface edge.

XXXI. EXCAVATIONS

Personnel Safe Work Practices (3.1)

1. .Competent person has completed daily inspection and has authorized any entry.
2. Personnel aware of entry requirements established by competent person.
3. Protective systems are free from damage and in stable condition.
4. Surface objects/structures secured from falling into excavation.
5. Potential hazardous atmospheres have been tested and found to be at safe levels.
6. Precautions taken to prevent cave-in from water accumulation in the excavation.
7. Personnel wearing appropriated PPE, HSP.
- General**
8. Daily safety briefing/meeting conducted with personnel.

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| 9. Excavation and protective systems adequately inspected by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Defective protective systems or other unsafe conditions corrected before entry. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Guardrails provided on walkways over excavations 6' or deeper . | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Barriers provided at excavations 6' or deeper when not readily visible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Barriers or covers provided for wells, pits, shafts, or similar excavation 6' or deeper. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Excavating equipment operated safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Prior to Excavating (3.2.2)</u> | | | | |
| 15. Location of underground utilities and installations identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Excavating Activities (3.2.3)</u> | | | | |
| 16. Rocks, trees, and other unstable surface objects removed or supproted. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Exposed underground utility lines supported. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Undermined surface structures supported or determined to be in safe condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Warning system used to remind equipment operators of excavation edge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Excavation Entry (3.2.4)</u> | | | | |
| 20. Trenches >4' deep provided with safe means of egress within 25'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Structure ramps designed and approved by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Potential hazardous atmospheres tested prior to entry. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Rescue equipment provided where potential for hazardous atmosphere exist. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Ventilation used to control hazardous atmospheres and air tested frequently. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Appropriate respiratory protection used when ventilation does not control hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Precautions taken to prevent cave-in from water accumulation in the excavation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Precautions taken to prevent surface water from entering excavation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Spoil piles, equipment, materials restrained or kept at least 2' from excavation edge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Protection provided from falling/rolling material from excavation face. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Excavation Protective Systems (3.2.5)</u> | | | | |
| 30. Protective systems used for excavations 5' or deeper. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Protective systems for excavations deeper than 20' designed by Professional Engineer and signed off. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. If soil unclassified, maximum allowable slope is 34°. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 33. Protective systems free from damage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Protective systems used according to manufacturers recommendations and not subject to loads exceeding design limits. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Protective system components securely connected to prevent movement or failure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Personnel removed from shielding systems when installed, removed, or vertical movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Cave-in protection provided while entering/exiting shielding system. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Protective System Removal (3.2.6)</u> | | | | |
| 38. Protective system removal starts and progresses from excavation bottom. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Protective systems removed slowly and cautiously. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Temporary structure supports used if failure of remaining components observed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Back-filling taking place immediately after protective system removal. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Excavating at Hazardous Waste Sites (3.2.7)</u> | | | | |
| 42. Waste disposal according to HSP and Environmental Protection Plan. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Appropriate decontamination procedures being followed, per HSP. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXII. DRILLING

Personnel Safe Work Practices. (3.1)

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

General (3.2.1)

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|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 9. Daily safety briefing/meeting conducted with crew. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Daily inspection of drill rig and equipment conducted before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Drill Rig Placement (3.2.2)

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| 11. Location of underground utilities identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Safe clearance distance maintained from overhead powerlines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 13. Drilling pad established, when necessary. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Drill rig leveled and stabilized. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Drill Rig Travel (3.2.3)</u> | | | | |
| 15. Rig shut down and mast lowered and secured prior to rig movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Tools and equipment secured prior to rig movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Only personnel seated in cab are riding on rig during movement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Safe clearance distance maintained while traveling under overhead powerlines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Backup alarm or spotter used when backing rig. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Drill Rig Operation (3.2.4)</u> | | | | |
| 20. Kill switch clearly identified and operational. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. All machine guards are in place. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Rig ropes not wrapped around body parts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Pressurized lines and hoses secured from whipping hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Drill operation stopped during inclement weather. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Air monitoring conducted per HSP for hazardous atmospheres. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Rig placed in neutral when operator not at controls. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Drill Rig Maintenance (3.2.5)</u> | | | | |
| 27. Defective components repaired immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Lockout/tagout procedures used prior to maintenance. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Cathead in clean, sound condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Drill rig ropes and wire lines in clean, sound condition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Fall protection used for exposures > 6'. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Rig in neutral and augers stopped rotating before cleaning. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Good housekeeping maintained on and around rig. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Drilling at Hazardous Waste Sites (3.2.6)</u> | | | | |
| 34. Waste disposal according to HSP and Environmental Protection Plan. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Appropriate decontamination procedures followed, per HSP> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXIII. EARTHMOVING EQUIPMENT

Personnel Safe Work Practices (3.1)

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|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Only authorized personnel operating earthmoving equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|--------------------------|

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 2. Personnel maintaining safe distance from operating equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Personnel and equipment operator in close communication when personnel must be in proximity of earthmoving equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Personnel approach operating equipment safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Personnel wearing high-visibility and/or reflective vests when close to operating equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel riding only in seats of equipment cab and using seat belts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel not positioned under hoisted loads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Personnel not hoisted by equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Personnel instructed not to approach equipment that has become electrically energized. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Personnel wearing appropriate PPE, per HSP. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| General (3.2.1) | | | | |
| 11. Daily safety briefing/meeting conducted with crew. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Daily inspection of equipment and equipment accessories conducted before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. At least one fire extinguisher available at the equipment operating area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Earthmoving Equipment Components (3.2.2) | | | | |
| 14. Backup alarm or spotter used when backing equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Operational horn provided on bi-directional equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Seat belts are provided and used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Rollover protective structures (ROPS) provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Braking system capable of stopping full payload. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Headlights and taillights operable when additional lights required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Brake lights in operable condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Cab glass provides no visible distortion to operator. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Dump truck operating levers provided with latch to prevent accidental dumping. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Dump truck beds provided with positive means of support during <u>maintenance or inspection.</u> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Hauling equipment (dump trucks) provided with cab shield or canopy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Earthmoving Equipment Placement (3.2.3)</u> | | | | |

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|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 25. Location of underground utilities identified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Safe clearance distance maintained while working under overhead lines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Safe distance is maintained while traveling under powerlines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Parking brake set when equipment parked and equipment chocked when parked on incline. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Unattended equipment visibly marked at night. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Earthmoving Equipment Operation (3.2.4)</u> | | | | |
| 30. Equipment operated on safe roadways and grades. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Equipment operated at safe speed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Equipment not operated during inclement weather, lightning storms. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Using equipment to lift loads, other than earth, done according to equipment manufacturer specifications. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Lifting and hauling capacities are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Equipment components lowered when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. All machine guards are in place. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Air monitoring conducted per HSP for hazardous atmospheres. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Earthmoving Equipment Maintenance (3.2.5)</u> | | | | |
| 38. Defective components repaired immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Suspended equipment or equipment parts are supported prior to work under or between. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Lockout/tagout procedures used prior to maintenance. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Tires on split rims removed using tire safety rack or cage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Good housekeeping maintained on and around equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Excavating at Hazardous Waste Sites (3.2.6)</u> | | | | |
| 43. Waste disposal according to waste plan and HSP | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Appropriate decontamination procedures followed, per HSP. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXIV. DEMOLITION

PERSONNEL SAFE WORK PRACTICES (3.1)

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel remain safe distance from demolition zone (DZ) during work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Personnel entering DZ, only when necessary. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Prior to DZ entry, competent person evaluates structure and authorizes Entry. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 4. Personnel aware of entry requirements established by competent person. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Competent person escorts personnel during DZ entry, if possible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel removed from DZ prior to activities that could affect structural integrity or safety. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel not positioned under hoisted loads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Personnel wearing appropriated PPE per HSP. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>PERSONNEL ACTIVITIES (3.2)</u> | | | | |
| 9. Demolition permit completed and submitted, as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Competent person completed engineering survey, available at site. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Regulated hazardous substances removed prior to demolition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Hazardous materials purged from tanks, pipes, and equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Utility service lines shut off, capped, or otherwise controlled, utilities notified. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Utilities needed for demolition temporary relocated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>GENERAL (3.2.1)</u> | | | | |
| 15. Daily safety briefing/meeting conducted with crew. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Daily inspection of demolition equipment conducted before use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Competent person inspecting DZ for hazards as work progresses. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Competent person controls entry into DZ, unauthorized entry prohibited. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Multi-story structures provided with adequate canopy over entrances. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Demolition starts at top of structure and proceeds downward. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Fire extinguisher available at demolition area. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>PROTECTION OF THE PUBLIC (3.2.2)</u> | | | | |
| 22. Demo work not performed in area occupied by public, unless permitted By contract. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Overhead protection provided for pedestrian traveled sidewalks. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Walking surfaces kept free of obstructions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Standard guardrails provided on pedestrian bridges, ramps, runways, and platforms. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Signs posted informing pedestrians of hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Temporary fence provided around perimeter of DZ adjacent to public | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- areas.
28. Watch placed at openings when DZ barricades temporarily removed.
29. Warning lights provided around DZ hazards at night, walkways lighted.
- WORK AREA PROTECTION (3.2.3)**
30. Wall openings protected by guardrail 42" high.
31. Fall protection provided for fall hazards 6' or greater.
32. Adequate barricades and signs provided when debris dropped through floor openings.
33. Floor opening, not used as material drops, adequately covered.
34. Signs, barricades, flagging used to warn personnel of hidden hazards.
35. Glass removed from structure, or personnel protected from fragments.
36. Damaged structure's walls and floors shored and braced.
37. All DZ accessways not meant to be accessed closed at all times.
38. Multi-story structure stairways adequately covered and illuminated.
39. DZ areas adequately illuminated.
40. Protruding reinforcing steel protected when personnel work above it.
- MANUAL REMOVAL OF WALLS AND MASONRY (3.2.4)**
41. Walls not permitted to fall on floors exceeding their carrying capacity.
42. Wall greater than one story not free standing unless originally designed to stand alone.
43. Personnel not working on walls during inclement weather.
44. Load-supporting members not cut until above floors demolished and removed.
45. Floor openings within 10' of walls are planked unless personnel removed from below.
46. Masonry debris removed from steel left in place as masonry demo progresses.
47. Walkways/ladders provided to safely reach scaffolds and walls.
48. Retaining walls removed only after supported material removed/secured
- MANUAL REMOVAL OF FLOORS (3.2.5)**
49. Debris removed from floor arches prior to demolition.
50. Plank walkways 18" or greater provided for access across demolished floors.

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 51. Planks overlap 1' and laid over solid bearings. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Areas under floor arch demolition barricaded and personnel removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>DEMOLITION USING HEAVY EQUIPMENT OR CRANES (3.2.6)</u> | | | | |
| 53. Personnel removed from DZ during use of mechanical equipment. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. Mechanical equipment positioned of floors capable of supporting
Imposed loads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. Working surface edges provided with curbs or stop-logs. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Heavy equipment operated safely . | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Roof stonework and steel members cut free prior to wall demolition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Demo ball weight appropriate for crane's rated load and line strength. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. Crane boom and loadline is as short as possible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Demo ball securely attached to loadline with swivel-type connection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Cranes operated safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>MATERIAL CHUTES (3.2.7)</u> | | | | |
| 62. Materials not dropped outside exterior walls unless area protected. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Chutes designed/constructed to withstand impact loads of debris. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. Chutes entirely enclosed except of insertion points, openings closed
when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Gate provided at chute discharge, competent employee controls gate. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Signs and barricades installed around chute discharge. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. Chute openings protected by guardrail where personnel stand to dump. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Toeboard provided in front of chute openings when mechanical
equipment used to dump. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. Personnel not entering chute to remove items. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>DEBRIS STORAGE (3.2.8)</u> | | | | |
| 70. Debris does not exceed allowable floor loads | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. Wood floor structures, only one floor above grade removed for debris
storage space. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. Wood floor beams supporting walls left in place or equivalent support
provided. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. Floor arches not removed 25' above grade for debris storage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 74. Storage spaces blocked off except when material is being removed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

HOUSEKEEPING (3.2.9)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|-------------------------------------|
| 75. Work areas, passageways, stairs, ladders, and exits kept free of debris. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 76. Demolition materials, tools, and equipment placed in an orderly manner. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 77. Receptacles provided for disposal of miscellaneous trash. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 78. Air, water, electrical, and welding lines positioned to eliminate tripping hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 79. Burning debris done according to local requirements. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 80. Fires completely extinguished at least 1 hour before end of day's work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

OTHER ACTIVITIES ASSOCIATED WITH DEMOLITION (3.2.10)

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 81. Scaffolds erected and used safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 82. Aerial lifts used safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 83. Stairways and ladders used safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 84. Control measures taken before welding/burning on hazardous coatings. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 85. Welding and cutting performed safely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXVI. HAND AND POWER TOOLS

SAFE WORK PRACTICES (3.1)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|
| 1. All tools operated according to manufacture's instructions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. All hand and power tools maintained in a safe condition and inspected before each use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Defective tools are tagged and removed from service until repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. PPE is selected and used according to tool-specific hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Power tools are not carried or lowered by cord or hose. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Tools are disconnected from energy sources when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Safety guards remain installed or are promptly replaced after repair. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Tools are stored properly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Cordless tools and recharging units conform to electrical standards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Tools used in explosive environments are rated for such use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Consider controls to avoid muscular skeletal, repetitive motion, and cumulative trauma stresses. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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.

26. Portable, power-driven circular saws are equipped with proper guards.

Abrasive Wheel Tools (3.2.3)

27. Employees using abrasive wheel tools are wearing eye protection.

28. Grinding machines are supplied with sufficient power to maintain spindle speed.

29. Abrasive wheels are closely inspected and ring-tested before use.

30. Grinding wheels are properly installed.

31. Cup-type wheels for external grinding are protected by proper guard.

32. Portable abrasive wheels used for internal grinding are protected by safety flange.

33. Safety flanges are used only with wheels designed to fit the flange.

34. Safety guards on abrasive wheel tools are mounted properly.

Pneumatic-Powered Tools (3.2.4)

35. Tools are secured to hoses or whip by positive means to prevent

- disconnect.
- | | | | | |
|--|--------------------------|--------------------------|--------------------------|-------------------------------------|
| 36. Safety clips or retainers are installed to prevent attachments being expelled. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 37. Safety devices are installed on automatic fastener feed tools. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Compressed air is not used for cleaning unless reduced to <30 psi, with PPE and guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Manufacturer's safe operating pressure for hoses, pipes, valves, are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Hoses >1/2 inch diameter have safety device at source to reduce pressure upon hose failure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Airless spray guns have required safety devices installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Blast cleaning nozzles are equipped with operating valves, which are held open manually. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Supports are provided for mounting nozzles when not in use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Air receivers drains, handholes, and manholes are easily accessible. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Air receivers are equipped with drainpipes, and valves for removal of Accumulated oil and water. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Air receivers are completely drained at required intervals. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Air receivers are equipped with indicating pressure gauges. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 48. Safety valves are tested at regular intervals for assure good operating condition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Safety, indicating, and controlling devices are installed as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Liquid Fuel-Powered Tools (3.2.5)</u> | | | | |
| 50. Liquid fuel-powered tools are stopped when refueling, servicing, or for maintenance. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Safe operating pressures of hoses, valves, pipes, filters, and other Fittings are not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Liquid fuel-powered tools are used in confined spaces in accordance with SOP HS-17 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Liquid fuels are stored and transported according to SOP HS-21. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Jacking Tools (3.2.6)</u> | | | | |
| 54. Rated capacities are legibly marked on jacks and not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. Jacks have a positive stop to prevent over-travel. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Base of jacks are blocked or cribbed to provide a firm foundation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Wood blocks are placed between the cap and load to prevent slippage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. After load is raised, it is cribbed, blocked, or otherwise secured Immediately. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 59. Antifreeze is used when hydraulic jacks are exposed to freezing temperatures. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Jacks are properly lubricated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Jacks are inspected as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Repair or replacement parts are examined for possible defects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Jacks not working properly are removed from service and repaired. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Hand Tools(3.2.7)</u> | | | | |
| 64. Wrenches are not used when jaws are sprung to the point of slippage. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Impact tools are kept free of mushroomed heads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Wooden handles of tools are kept free of splinters or cracks and are tightly fitted in tool. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXV. CONCRETE AND MASONRY

Safe Work Practices (3.1)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Personnel on areas where concrete is being poured are wearing PPE. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Protruding rebar is adequately guarded to control impalement hazards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Personnel do not ride concrete buckets or position themselves in lifting areas. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Personnel maintain safe distance from formwork, shoring, percast, and lift-slab operations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Personnel do not enter limited access zones during masonry wall work. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel are not permitted under loads being lifted or walls being jacked. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel access is limited in areas where post-tension operations are performed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Scaffolding conforms to the requirements of SOP HS-73 prior to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Excavations conform to the requirements of SOP HS-32 prior to entry. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Lifting and rigging devices conform to the requirements of SOP HS-44. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

General (3.2.1)

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 11. Concrete structures where loads to be placed, inspected. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Protruding rebar, guarded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. No employees permitted behind jack during tensioning unless directly involved in the operation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Signs/barriers are erected to limit employee access to post tension areas. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Tools, Materials, and Equipment

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 15. Requirements for confined space entry and lockout/tagout are met. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Concrete mixers have cleaning devices and guards installed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Portable/rotating concrete troweling machines have shutoff devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Concrete buggy handles do not extend beyond the wheels on either side. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Concrete pumping systems using discharge pipes are supported. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Concrete buckets w/hydraulic or pneumatic gates have positive lock. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Employees not permitted under concrete buckets during lifts and lowers. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Elevated concrete buckets are routed around employees. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Employees do not ride concrete buckets. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Sections of tremies or similar concrete conveyances are secured with wire rope. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Bull float handles were contact with electrical lines, are nonconductive. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Masonry saws are guarded with a semicircular enclosure over the blade. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Employees applying concrete through a hose are wearing PPE. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Formwork and Shoring (3.2.3)</u> | | | | |
| 28. Formwork is capable of supporting loads that may be reasonably anticipated to be applied. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Drawings and plans required to be at the jobsite are available. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Shoring equipment is inspected prior to erection. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Damaged shoring equipment is not used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Erected shoring is inspected prior to, during, and immediately after concrete placement. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Sills from shoring are sound, rigid, and capable of carrying the maximum intended load. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Base plates, shore heads, extension devices, and adjustment screws are installed correctly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Eccentric loads on shore heads and similar are prohibited unless designed for such loads. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Whenever single-post shores are tiered, shoring is designed and inspected | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Tiered single-post shores are vertically aligned and adequately braced. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Adjustment of single-post shores to raise framework is not made after placement of concrete. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 39. Re-shoring is erected when concrete is required to support loads in excess of its capacity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Forms/shores are only removed when concrete has gained sufficient strength as needed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. Re-shoring is not removed until concrete being supported has attained adequate strength to support its weight and all loads placed upon it. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Precast concrete wall units, structural framing and tilt-up wall panels are adequately supported to prevent overturning or collapse until permanent connections are completed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Masonry walls over 8 feet in height are adequately braced. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Lifting and Jacking (3.2.4)</u> | | | | |
| 44. Embedded lifting inserts attached to precast concrete members have required strength. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Lifting hardware is capable of supporting at least five times the Maximum intended load. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Employees are not permitted under precast concrete members being lifted or tilted. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Lift-slab operations are planned by a registered Professional Engineer. (PE) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Jacks/lifting units are marked to indicate the manufacturer's rated capacity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. Jacks/lifting units are not loaded beyond the manufacture's rated capacity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Jacking equipment is capable of supporting at least two and one-half times the load. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Jacks/lifting units have a safety device, which will provide load support upon malfunction. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Jacks/lifting units are designed not to lift or continue to lift beyond their rated capacity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Jacking operations are synchronized to maintain slab within ½ inch of level position. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 54. If using automatic leveling, a device is installed that will stop the operation as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. A competent person is attending a centrally located manual leveling control. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. The maximum number of manually controlled jacks/lifting units on one slab is limited as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. No non-essential employees are permitted on buildings/structures while jacking is occurring. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. No non-essential employees are permitted beneath a slab while it is being lifted. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. When making temporary connections to support slab, wedges are secured. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. Welding on temporary and permanent connections is performed by a certified welder. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Load transfers from jacks/lifting units to building columns are not done until welds on column shear plates are cooled to air temperature. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 62. Jacks/lifting units are positively secured to columns as to not become dislodged or dislocated. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. Equipment is designed/installed so that the lifting rods cannot slip out of position. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. Jacks/vertical supports are positioned so as loads do not exceed rated capacity of jacks. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Jacks/lifting devices are designed to support slip forms in the event of failure. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. Form structure is maintained within design tolerances specified for plumbness. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. Predetermine safe rate of lift is not exceeded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Limited Access Zones (3.2.5)</u> | | | | |
| 68. A limited access zone is established wherever a masonry wall is being constructed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. The limited access zone is established prior to the start of construction of the wall. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. The limited access zone is equal to the height of the wall to be constructed plus 4 feet and runs the entire length of the wall. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. The limited access zone is established on the side of the wall, which will be unscaffolded. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. The limited access zone restricts entry to employees not engaged in Constructing the wall. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. The limited access zone remains in place until the wall is adequately braced, as required. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

XXXVI. AERIAL LIFTS

Safe Work Practices (3.1)

- | | | | | |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. Only authorized and trained personnel operating aerial lifts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Aerial lifts inspected by the operator prior to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Lift controls tested by the operator each day prior to use. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Personnel wearing full body harness with lanyard attached to boom or platform. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Lanyards not attached to adjacent structures or equipment while in aerial lift. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Personnel standing firmly on the floor of lift platform. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Personnel remain in the platform at all times and do not climb to adjacent structures. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Standard guardrail or equivalent protection provided on lift platform. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Aerial lifts provided with upper and lower controls. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Lower controls operated only with permission of personnel in lift, unless emergency. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- | | | | | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 11. Lift controls properly marked and legible, and capacity rating posted. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Modifications to aerial lift certified in writing by manufacturer. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Aerial Lift Positioning (3.2.2)</u> | | | | |
| 13. Aerial lifts positioned on firm, level surface with brakes set. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Wheel chocks used on inclines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Outriggers positioned on solid surfaces or cribbing when used. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Safe clearance distance maintained while working near overhead powerlines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Safe clearance distance maintained while traveling under overhead powerlines. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Aerial lifts not moved when boom is elevated and personnel are working in platforms. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Boom is properly cradled and outriggers stowed prior to moving lift. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <u>Aerial Lift Operation (3.2.3)</u> | | | | |
| 20. Safe operating manual should be available for review and use by aerial lift operators. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Aerial lift operators know boom and basket load limits and do not exceed them. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Aerial lift platforms are free of slippery conditions. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Personnel not standing or working below aerial lift operations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Warning signs or barricades provided under aerial lift operations. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Counterweight swing radius barricaded or flagged. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Aerial lifts not being used as cranes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Platforms free of attachments such as cables, wires, chains, or ropes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Aerial lifts not operated in winds exceeding 30 miles per hour. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Platform foot switch physically operated and not mechanically blocked. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Aerial lifts used indoors have exhaust properly vented to control carbon monoxide exposures. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Insulating portion of aerial lift is not altered in any manner. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Appendix B

Sampling and Analysis Forms

- Field Sampling Report
- Boring Log
- Well Development Record
- Monitor Well Static Water Level Form
- Monitor Well Purging Form
- Well Construction Details and Abandonment Form

BORING LOG

Borehole ID: _____

Sheet _____ of _____

				Location						
Project Name		Project Number		LTCCODE (IRPIMS)		Site ID	LPRCODE (IRPIMS)			
Drilling Company		Driller		Ground Elevation		Total Drilled Depth				
Drilling Equipment	Drilling Method	Borehole Diameter	Date/Time Drilling Started		Date/Time Total Depth Reached					
Type of Sampling Device				Water Level (bgs)						
				First		Final				
Sample Hammer				Hydrogeologist		Checked by/Date				
Type	Driving Wt.	Drop								
Location Description (include sketch in field logbook)										
Depth	Interval	Recovery	Blow Counts	Description <small>(Include lithology, grain size, sorting, angularity, Munsell color name & notation, mineralogy, bedding, plasticity, density, consistency, etc., as applicable)</small>			USCS Symbol	Lithology	Water Content	Remarks <small>(Include all sample types & depth, odor, organic vapor measurements, etc.)</small>

WELL CONSTRUCTION DETAILS AND ABANDONMENT FORM

FIELD REPRESENTATIVE: _____ TYPE OF FILTER PACK: _____

DRILLING CONTRACTOR: _____ GRADIATION: _____
 AMOUNT OF FILTER PACK USED: _____

DRILLING TECHNIQUE: _____ TYPE OF BENTONITE: _____

AUGER SIZE AND TYPE: _____ AMOUNT BENTONITE USED: _____

BOREHOLE IDENTIFICATION: _____ TYPE OF CEMENT: _____

BOREHOLE DIAMETER: _____ AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: _____ GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: _____

WELL CONSTRUCTION COMPLETE DATE: _____ DIMENSIONS OF SECURITY CASING: _____

SCREEN MATERIAL: _____ TYPE OF WELL CAP: _____

SCREEN DIAMETER: _____ TYPE OF END CAP: _____

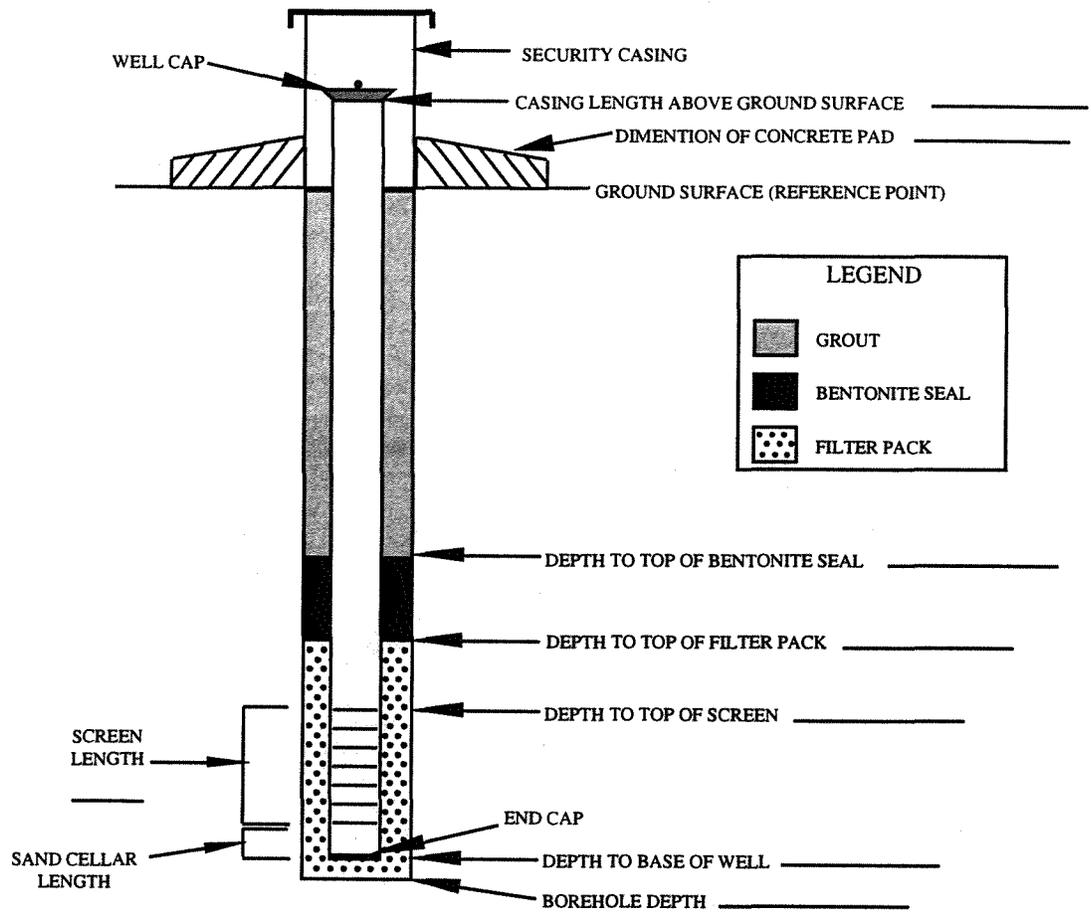
STRATUM-SCREENED INTERVAL (FT): _____

COMMENTS:

CASING MATERIAL: _____

CASING DIAMETER: _____

SPECIAL CONDITIONS
(describe and draw)



LEGEND	
	GROUT
	BENTONITE SEAL
	FILTER PACK

NOT TO SCALE

INSTALLED BY: _____ INSTALLATION OBSERVED BY: _____

DISCREPANCIES: _____

WELL CONSTRUCTION DETAILS AND ABANDONMENT FORM

FIELD REPRESENTATIVE: _____ TYPE OF FILTER PACK: _____

DRILLING CONTRACTOR: _____ GRADIATION: _____

DRILLING TECHNIQUE: _____ TYPE OF BENTONITE: _____

AUGER SIZE AND TYPE: _____ AMOUNT BENTONITE USED: _____

BOREHOLE IDENTIFICATION: _____ TYPE OF CEMENT: _____

BOREHOLE DIAMETER: _____ AMOUNT CEMENT USED: _____

WELL IDENTIFICATION: _____ GROUT MATERIALS USED: _____

WELL CONSTRUCTION START DATE: _____

WELL CONSTRUCTION COMPLETE DATE: _____ DIMENSIONS OF SECURITY BOX: _____

SCREEN MATERIAL: _____ TYPE OF WELL CAP: _____

SCREEN DIAMETER: _____ TYPE OF END CAP: _____

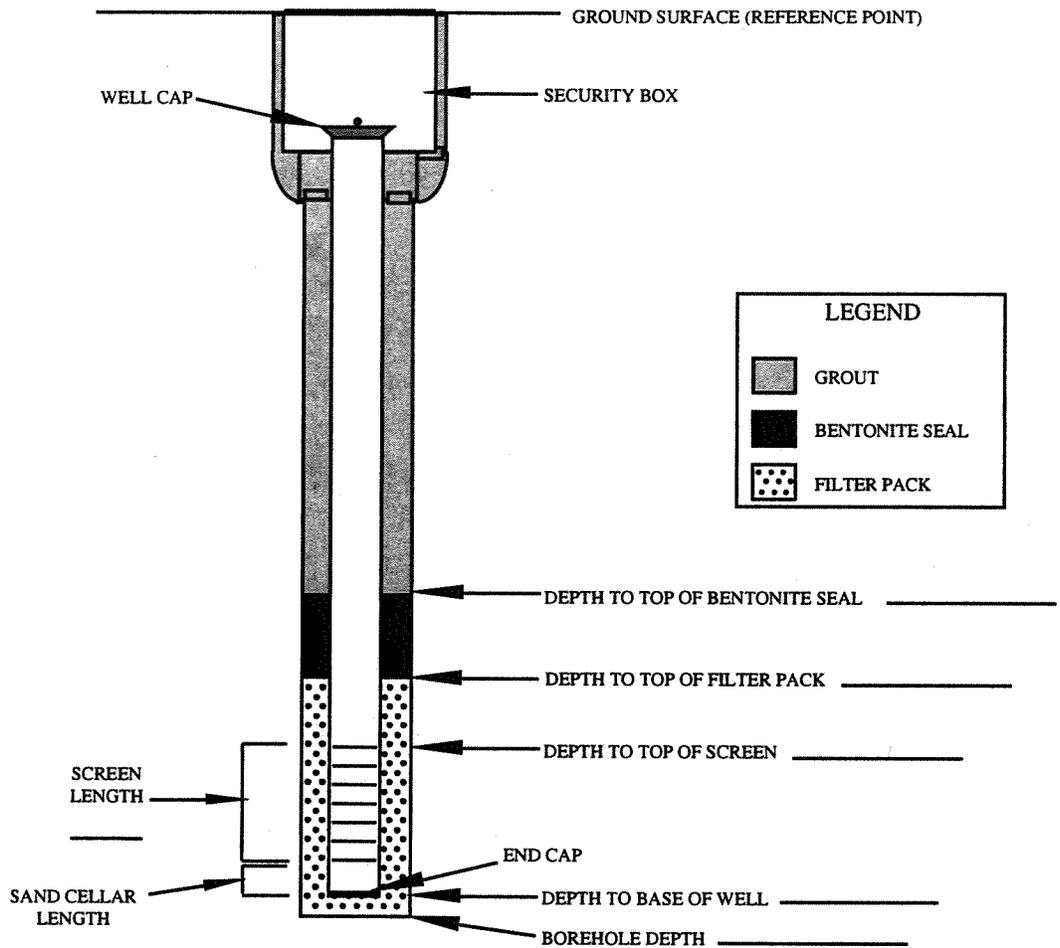
STRATUM-SCREENED INTERVAL (FT): _____

COMMENTS:

CASING MATERIAL: _____

CASING DIAMETER: _____

SPECIAL CONDITIONS
(describe and draw)



NOT TO SCALE

INSTALLED BY: _____ INSTALLATION OBSERVED BY: _____

DISCREPANCIES: _____

Appendix C

Quality Control Forms

- Submittal Register
- Contractor Production Report
- Daily Contractor Quality Control Report
- Testing Plan and Log
- Monthly Summary Report of Field Tests
- Example of QC Meeting Minutes Form
- Rework Items List
- Nonconformance Notice

CONTRACTOR PRODUCTION REPORT				Date	
(Attach Additional Sheets If Necessary)					
Contract No. Navy Contract # N62467-98-D-0995		CTO # CTO 0055	Location Millington, Tennessee		Report No.
Contractor: CH2M HILL Constructors, Inc.			Superintendent:		
AM Weather		PM Weather	Max Temp	°F	Min Temp
JOB SAFETY	Was A Job Safety Meeting Held This Date? <small>(If Yes, attach copy of the meeting minutes)</small>		<input type="checkbox"/> Yes	<input type="checkbox"/> No	Total Worked Hours On Job Site This Date
	Were There Any Lost Time Accidents This Date? <small>(If Yes, attach copy of completed OSHA report)</small>		<input type="checkbox"/> Yes	<input type="checkbox"/> No	Cumulative Total Of Work Hours From Previous Report
	Was Trenching/Scaffold/HV Electrical/High Work Done? <small>(If Yes, attach statement or checklist showing inspection performed)</small>		<input type="checkbox"/> Yes	<input type="checkbox"/> No	Total Work Hours From Start Of Construction
	Was Hazardous Material/Waste Released Into The Environment? <small>(If Yes, attach description of incident and proposed action)</small>		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
List Safety Actions Taken Today/Safety Inspections Conducted				<input type="checkbox"/>	Safety Requirements Have Been Met
Equipment/Material Received Today to be Incorporated in Job					
Construction and Plant Equipment of Job Site Today. Include Number of Hours Used Today.					
Work Performed Today					
Work Location and Description		Employer	Number	Trade	Hrs
Remarks					
_____ Contractors Superintendent				_____ Date	



CONTRACTOR QUALITY CONTROL REPORT				DATE
PREPARATORY PHASE				
Preliminary Tasks	Yes	No	N/A	Remarks
1. Plans and specs review complete?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Submittals have been reviewed and approved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Stored/delivered materials comply with submittals and are properly stored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Testing plan has been developed and reviewed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Work method and schedule discussed with Contracting Officer Rep.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Other preliminary work completed correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Definable Feature of Work				
Work Location:				
Personnel Present:				
INITIAL PHASE				
Preliminary and Ongoing Tasks	Yes	No	N/A	Remarks
1. Sample has been prepared and approved?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Workmanship complies with specifications/industry standards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Test results are acceptable?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Work complies with contract requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Preliminary work completed correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Definable Feature of Work				
Work Location:				
Personnel Present:				
Sampling/Testing Performed	Sampling/Testing Company	Site Technician		
FOLLOW-UP PHASE				
Preliminary and Ongoing Tasks	Yes	No	N/A	Remarks
1. Work complies with contract requirements as approved in initial phase?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Definable Feature of Work				
Work Location:				
Personnel Present:				
Sampling/Testing Performed	Sampling/Testing Company	Site Technician		

CONTRACTOR QUALITY CONTROL REPORT	DATE
Rework items identified today which were not corrected by close of business:	
Rework items corrected today which were on the rework items list:	
COMMENTS	
<p>On behalf of the contractor, I certify that this report is complete and correct, and equipment and material used, and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge, except as noted in this report.</p>	
_____	_____
QC Inspector	Date
CONTRACTOR QUALITY CONTROL REPORT	DATE
Quality assurance representative's remarks and/or exceptions to this report:	
<p style="text-align: right;">_____</p> <p style="text-align: right;">Government Quality Control Manager Date</p>	

Monthly Summary Report of Field Tests



Start Date:		End Date:		Submitted Date:	
Contract Number: Navy Contract # N62467-98-D-0995		CTO No.: CTO 0055		CTO Title: Navy Support Activity Mid-South	
Location: Millington, Tennessee					
A	B		C		D
Type of Test Required	Date of Test		Reporting Laboratory		Test Results

MEETING SUMMARY

Quality Control Meeting

CTO 008

ATTENDEES: Site Superintendent
ROICC Inspector

COPIES: PM
QCPM

FROM:

DATE:

1. Meeting date June 30, 1998.
2. Reviewed meeting 2 minutes. No corections or amendments required.
3. Reviewed progress schedule.
 - a. Completed excavation of contaminated soil under removed tank 001.
 - b. No rework identified since meeting 2.
 - c. No rework required or in progress.
4. Submittal status:
 - a. Reviewed submittal 007, air sparging unit. Approved as noted.
 - b. Expect submittal on control valves next week.
5.
.
.
.
8. Next meeting in 2 weeks, July 14, 1998.



NON-CONFORMANCE NOTICE

PHONE: 770-604-9182-259

FAX: 770-604-9282

CTO: CTO 0055, Navy Support Activity Mid-South NCN NO: _____

CONTRACT: Navy Contract # N62467-98-D-0995 NCN DATE: _____

TO: U.S. Navy

SUBCONTRACTOR: _____

You are hereby notified that tests and/or inspection indicates that work performed does not conform to the subcontract requirements.

Non-conforming work may be required to be removed and replaced at no cost to CCI. It shall be your responsibility to determine the corrective action necessary and advise the Site Superintendent and Quality Control Inspector (QCI) within 24 hours.

 Quality Control Inspector Date

ITEM DESCRIPTION: _____

TEST/INSPECTION: _____

CONTRACT SPECIFICATION/ DRAWING _____

Non-Conformance Description: _____

Subcontract Requirement: _____

Subcontractor's proposed corrective action: _____ (Attach additional pages if necessary)

 Subcontractor's Representative Title Date

Project Manager's Response: Concur - Net Concur - See Requirements Don't Concur - See Comments

 Project Manager Date

Subcontractor's final corrective action: _____ (Attach additional pages if necessary)

 Subcontractor's Representative Title Date

Final return of Non-Conformance Notice returned to Project Manager and QCI on:

 Quality Control Inspector Date

- Copy:
1. RAC
 2. File
 3. Field File

Appendix D

Waste Management Forms

- Waste Inventory Tracking Form
- Transportation and Disposal Log

