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WORK PLAN FOR VARIOUS TANK ACTIONS AT THE CHICORA TANK FARM BUILDINGS  
236, 1279 AND THE RESERVE TRAINING CENTER AND QUALITY ASSURANCE QUALITY  
CONTROL PLAN CNC CHARLESTON SC  
01/01/2009  
ADVENT ENVIRONMENTAL INC

# WORK PLAN

## VARIOUS TANK ACTIONS AT THE CHICORA TANK FARM, BUILDINGS 236, 1279, AND THE RESERVE TRAINING CENTER

CHARLESTON NAVAL COMPLEX  
NORTH CHARLESTON, SOUTH CAROLINA

Prepared For:

*Chicora 13350*

*Reserve 13370*



BRAC Program Management Office, Southeast  
4130 Faber Place Drive, Suite 202  
North Charleston, South Carolina

Contract Number:

N62467-06-D-0125

Task Order:

0048

Prepared By:

ADVENT Environmental, Inc.  
498 Wando Park Blvd.  
Suite 500  
Mt. Pleasant, SC 29464

**RECEIVED**

JAN 24 2009

LAND FORCE DIVISION - E2771

Prepared by: \_\_\_\_\_  
ADVENT-James W. Weeg, P.G.

Approved by: \_\_\_\_\_  
BRAC SE-Kathryn A. Stewart, P.E.

January 2009  
ADVENT Project 09-500

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Appendix B	Environmental Protection Plan
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## ACRONYM LIST

µg/L	Micro-grams per liter
ADVENT	Advent Environmental, Inc.
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethyl-benzene, Xylenes
CFR	Code of Federal Regulations
CNC	Charleston Naval Complex
CTF	Chicora Tank Farm
DPT	Direct Push Technology
EPA	U.S. Environmental Protection Agency
IDW	Investigation Derived Waste
IGWA	Initial Groundwater Assessment
MCL	Maximum Contaminant Levels
mg/L	milligrams per liter
MSDS	Material Safety Data Sheet
NOAA	National Oceanic and Atmospheric Association
PAH	Polynuclear Aromatic Hydrocarbons
PID	Photo-ionization device
PPE	Personal Protective Equipment
ppm	Parts Per Million
RBSL	Risk Based Screening Level
SCDHEC	South Carolina Department of Health and Environmental Control
SHSO	Site Health and Safety Officer
SOW	Scope of Work
SSHSP	Site Specific Health and Safety Plan
UST	Underground Storage Tank

## 1.0 INTRODUCTION

ADVENT Environmental, Inc. (ADVENT) has been retained by Base Realignment and Closure (BRAC) Program Management Office, Southeast to provide services for Various Tank Actions at the Chicora Tank Farm (CTF), Buildings 236, 1279, and the Reserve Training Center located at the Charleston Naval Complex (CNC), North Charleston, South Carolina. This work will be performed by ADVENT under contract number: N62467-06-D-0125, Task Order: 0048.

As per the Statement of Work (SOW) dated December 15, 2008, the objectives for this project include:

- Perform assessment via a limited direct push technology (DPT) investigation at the CNC Reserve Training Center,
- Perform additional investigation, via twelve (12) soil borings, at the CTF in an attempt to further delineate the source of naphthalene that is present above the risk-based screening level (RBSL) in samples collected at MW34-R,
- Perform two rounds of semi-annual sampling and analysis of the twenty-five (25) accessible monitoring wells at the Chicora Tank Farm (CTF),
- Perform three (3) rounds of semi-annual sampling and analysis of the three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) located at Building 1279, and,
- Abandon three monitoring wells at Building 236.

Publications listed below were used in the development of this work plan and are referenced in the text by basic designation only.

- 29 CFR 1926 Safety and Health Regulations for Construction
- R.61-71 South Carolina Well Standards, dated April 26, 2002
- R.61-92, Part 280 Underground Storage Tank Control Regulations, dated May 23, 2008

- South Carolina Risk Based Corrective Action for Petroleum Releases, May 15, 2001

## **2.0 DESCRIPTION OF WORK**

The project sites are located at the former CNC in North Charleston, SC. ADVENT will conduct two DPT investigations, additional sampling activities at buildings 1279 and the CTF, and abandon three monitoring wells at Building 236.

### **2.1 Direct Push Technology (DPT) investigation at the CNC Reserve Training Center**

ADVENT will conduct a limited DPT investigation to determine if groundwater has been impacted by two former fuel oil underground storage tanks (USTs), at the former Reserve Training Center, which is currently site of the National Oceanic and Atmospheric Association Coastal Services Center, located at the CNC. The investigation will be performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) electronic mail dated October 13, 2008. The analyses of collected samples will be conducted by a South Carolina certified laboratory.

Five (5) soil samples will be collected, which will consist of two (2) samples collected from each former UST site (one at each UST site and one downgradient of each UST site) and one (1) duplicate. Soil samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), and naphthalene via EPA Method 8260B, and polynuclear aromatic hydrocarbons (PAHs) via EPA Method 8270C (Table-1).

Five (5) groundwater samples will be collected, which will consist of two (2) samples collected from each former UST site (one at each UST site and one downgradient of each UST site) and one (1) duplicate. Groundwater samples will be analyzed for BTEX, and naphthalene via EPA Method 8260B, and PAHs via EPA Method 8270C (Table-1). Waste generated during the sampling activities at the site will be placed in appropriate containers and properly disposed of in accordance with applicable federal, state, and local requirements.

Once field work is complete, ADVENT will provide an Assessment Report for the former Reserve Training Center in accordance with the submittal schedule presented in the SOW dated December 15, 2008.

**Table 1**  
**Reserve Training Center Sampling Parameters**

Parameter	Soils		Water	
	Method	MCL	Method	MCL
Benzene	8260B	7 µg/kg	8260B	5 µg/L
Toluene	8260B	1,450 µg/kg	8260B	1,000 µg/L
Ethylbenzene	8260B	1,150 µg/kg	8260B	700 µg/L
Total Xylenes	8260B	14,500 µg/kg	8260B	10,000 µg/L
Naphthalene	8260B	36 µg/kg	8260B	25 µg/L
Benzo (a) anthracene	8270C	66 µg/kg	8270C	10 µg/L
Benzo (b) flouranthene	8270C	66 µg/kg	8270C	10 µg/L
Benzo (k) flouranthene	8270C	67 µg/kg	8270C	10 µg/L
Chrysene	8270C	68 µg/kg	8270C	10 µg/L
Dibenz (a,h) anthracene	8270C	69 µg/kg	8270C	10 µg/L

## 2.2 Chicora Tank Farm Soil Investigation

ADVENT will conduct an additional investigation via twelve (12) soil borings utilizing DPT at the CTF in an attempt to further delineate the source of naphthalene that is present above the RBSL in MW34R. The analyses of collected samples will be conducted by a South Carolina certified laboratory.

Thirteen (13) soil samples will be collected, which will consist of twelve (12) samples collected in a grid pattern in the vicinity of MW 34R and one (1) duplicate. Soil samples will be analyzed for BTEX and naphthalene via EPA Method 8260B (Table-2).

Thirteen (13) groundwater samples will be collected, which will consist of twelve (12) samples collected in a grid pattern in the vicinity of MW34R and one (1) duplicate. Groundwater samples will be analyzed for BTEX and naphthalene via EPA Method 8260B (Table 2). Waste generated during the sampling activities at the site will be placed in appropriate containers and properly disposed of in accordance with applicable federal, state, and local requirements.

Once field work is complete, ADVENT will provide an Assessment Report in accordance with the submittal schedule presented in the SOW.

**Table 2**  
**CTF Soil Investigation Sampling Parameters**

Parameter	Soils		Water	
	Method	MCL	Method	MCL
Benzene	8260B	7 µg/kg	8260B	5 µg/L
Toluene	8260B	1,450 µg/kg	8260B	1,000 µg/L
Ethylbenzene	8260B	1,150 µg/kg	8260B	700 µg/L
Total Xylenes	8260B	14,500 µg/kg	8260B	10,000 µg/L
Naphthalene	8260B	36 µg/kg	8260B	25 µg/L

### 2.3 Chicora Tank Farm Groundwater Monitoring

ADVENT will perform two (2) rounds of semi-annual sampling and analysis of the twenty-five (25) accessible monitoring wells at the CTF. The sampling will be performed in the August 2009 and February 2010 timeframes. The analyses of collected samples will be conducted by a South Carolina certified laboratory.

Twenty-seven (27) groundwater samples will be collected, which will consist of twenty-five (25) groundwater samples and two (2) duplicates will be collected at each sampling event. As per the SCDHEC Risk-Based Corrective Action for Petroleum Releases document, dated May 15, 2001, groundwater samples will be analyzed for BTEX and methyl tertiary butyl ether (MTBE) via EPA Method 8260B, for PAHs via EPA Method 8270C, and for ethylene dibromide (EDB) via EPA Method 8011 (Table-3). Waste generated during the sampling activities at the site will be placed in appropriate containers and properly disposed of in accordance with applicable federal, state, and local requirements.

Following each semi-annual sampling event, ADVENT will provide a Groundwater Monitoring Report for the Chicora Tank Farm in accordance with the submittal schedule presented in the SOW.

**Table 3**  
**Chicora Tank Farm Sampling Parameters**

Parameter	Water	
	Method	MCL
Benzene	8260B	5 µg/L
Toluene	8260B	1,000 µg/L
Ethylbenzene	8260B	700 µg/L
Total Xylenes	8260B	10,000 µg/L
Naphthalene	8260B	25 µg/L
Benzo (a) anthracene	8270C	10 µg/L
Benzo (b) flouranthene	8270C	10 µg/L
Benzo (k) flouranthene	8270C	10 µg/L
Chrysene	8270C	10 µg/L
Dibenz (a,h) anthracene	8270C	10 µg/L
Ethylene Dibromide (EDB)	8011	0.05 µg/L

#### **2.4 Building 1279, Semi-Annual Sampling**

ADVENT will perform three (3) rounds of semi-annual sampling and analysis at three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) located at Building 1279. The sampling will be performed in the February 2009, August 2009, and February 2010 timeframes. ADVENT will conduct the groundwater monitoring in accordance with the requirements detailed in a SCDHEC letter dated June 22, 2005. The analyses of collected samples will be conducted by a South Carolina certified laboratory.

Per sampling event, four (4) groundwater samples will be collected. These samples will consist of three (3) groundwater samples and one (1) duplicate. The groundwater samples collected will be analyzed for BTEX and naphthalene via EPA Method 8260B (Table-4).

Results of sampling will be submitted in a Groundwater Monitoring Report, in accordance with the submittal schedule presented in the SOW.

**Table-4**  
**Bldg 1279 GW Sampling Parameters**

Parameter	Water	
	Method	MCL
Benzene	8260B	5 µg/L
Toluene	8260B	1,000 µg/L
Ethylbenzene	8260B	700 µg/L
Total Xylenes	8260B	10,000 µg/L
Naphthalene	8260B	25 µg/L

## 2.5 Well Abandonment, Building 236

Advent will perform the abandonment and removal of three (3) monitoring wells (236MW001, 236MW002, and 236MW003) at Building 236. These activities will be performed by a South Carolina certified well driller under ADVENT supervision. The well driller will complete the Form 1903, but ADVENT will submit this and supporting documentation related to the well abandonment to SCDHEC.

### 3.0 SUBMITTALS

ADVENT will prepare Groundwater Monitoring Reports summarizing each completed work element. A photographic record of the work will be compiled for historical purposes and included in each report. One (1) draft copy of the each Groundwater Monitoring Report will be provided to BRAC Program Management Office (PMO) SE for review. Once approved, three (3) final copies of each report will be submitted to BRAC PMO SE.

After all signatures (both the Contractor's and the Navy's) have been affixed to all signature pages in the final deliverables, ADVENT will provide two (2) CD copies of the final deliverable for each site. Adobe Acrobat software shall be used to convert word-processing files to searchable portable document format (PDF). Final GIS drawings shall also be provided in PDF format and shall be produced for a 600 dpi (dots per inch) minimum monochrome pdf writer printer driver; if drawings include signatures, electronically sign and seal the GIS drawings prior to converting to final PDF format. Sketches, photos, or forms not available in electronic format may be scanned for conversion to PDF format.

The entire final deliverable (both word processing documents and GIS drawings, etc.) including the Work Plan, Health and Safety Plan, Environmental Protection Plan, QA/QC Plan, Monitoring Reports, and Corrective Action Plan shall be combined into a single CD. There shall be one .pdf file for each document, letter, common file folder, or report.

Each CD shall be labeled with activity name, document title, contract number, and final document approval date.

## **4.0 QUALIFICATIONS AND RESPONSIBILITIES**

ADVENT's Project Manager, Site Manager, and employees, who have had a wide range of experience working at complex industrial sites, will perform the work. Personnel involved with this project have experience in the performance of groundwater assessments. Personnel will have experience handling and disposing of wastes encountered during environmental assessments. These personnel will also be trained and certified per the OSHA guidelines.

### **4.1 Project Principal**

Ms. Kate Hendrickson Borg, CHMM, will serve as the Project Principal and technical resource for this project. Ms. Borg has sixteen (16) years of experience managing environmental assessments and remediation projects for private sector, municipal and military clients.

### **4.2 Manager/Site Health and Safety Officer**

Mr. James Weeg, P.G., will serve as the Project Manager/Site Health and Safety Officer (SHSO) for this project. Mr. Weeg has six (6) years of experience managing environmental assessment and remediation projects at commercial and DOD facilities.

### **4.3 Site Supervisor**

Mr. James Weeg, P.G., will serve as the Site Supervisor for this project. Mr. Weeg has six (6) years of experience managing environmental assessment and remediation projects at commercial and DOD facilities.

#### **4.4 Corporate Health and Safety Manager**

Mr. Chris Brown will serve as the Corporate Health and Safety Manager. Mr. Brown has four (4) years of experience in the requirements for site health and safety in relation to environmental projects.

## **5.0 GENERAL REQUIREMENTS**

### **5.1 Site-Specific Health and Safety Plan (SSHSP)**

The Site-Specific Health and Safety Plan (SSHSP) is included in Appendix A of this work plan. A copy of the SSHSP will be onsite during all work performed. The Project Manager/Site Supervisor will be responsible for site safety.

### **5.2 Environmental Protection Plan**

An Environmental Protection Plan (EPP) is included in Appendix B of this work plan. The procedures outlined in this EPP will be implemented during site work to ensure that the natural resources within and surrounding the site are preserved in their existing condition or will be restored to an equivalent or improved condition.

Measures will be taken to prevent oily or hazardous substances from entering the ground, drainage areas, or local bodies of water as outlined in EPA Regulations on Oil Pollution Prevention, 40 Code of Federal Regulations (CFR) 112 and SCDHEC regulations. A copy of the EPP will be onsite during all work performed and is provided in Appendix B.

Site activities will be performed so as to reduce the possibility for a spill or release. In the event of a spill or release, the work crew will initiate corrective action and notification will be made immediately to the BRAC PMO SE Project Manager, Kathryn Stewart. ADVENT will have clean-up material and equipment available onsite in the event of a spill or release.

### **5.3 Exclusion Zone and Contamination Reduction Zone**

Personnel not directly involved with the project will not enter the work zones, called the Exclusion Zone (EZ) and the Contamination Reduction Zone (CRZ). The EZ will be a

minimum of 10 feet from the limits of sampling activities. The SHSO will determine the perimeters of these zones based on field conditions and operational security.

#### **5.4 Security**

During the performance of work, a barrier preventing unintentional entrance of the general population into the work zone will isolate the work area at the site. The Project Manager will be responsible for establishing the barrier prior to start of work.

#### **5.5 Ignition Sources**

Two (2) 10-pound ABC fire extinguishers will be readily available on the work site. The fire extinguishers will be located no closer than 25 feet and not more than 75 feet from the work area.

Prior to performing work that might involve the release of flammable or hazardous vapors, vehicular and personnel traffic will be routed away from the immediate area. All sources of ignition, including smoking, welding, burning, or other work that might be a source of ignition, will be eliminated from the work area where flammable vapors may be present or likely to travel. This will include insuring all openings into surrounding structures are secured so as not to allow flammable vapors to concentrate inside.

#### **5.6 Personnel and Equipment Decontamination**

Equipment will be decontaminated as appropriate before exiting the work zones. Decontamination procedures will be performed by wiping, sweeping, and/or scrubbing with water if needed to remove oil, or oily dirt, sand, and mud from coveralls, gloves, boots, tools, and equipment. Efforts will be made to minimize the use of water. Sampling equipment will be decontaminated in accordance with ADVENT Standard Operating Procedures (SOPs) (Appendix C).

## **5.7 Waste Management**

Purge water and decontamination water, if generated, will be containerized in DOT approved 55-gallon drums. Data resulting from analyses performed on samples collected during the groundwater sampling will be used for waste characterization. The material will be shipped to a permitted waste disposal facility. Waste classified as PPE, disposable suits, gloves, boots, respirator cartridges, and plastic sheeting will be disposed of as non-regulated solid waste.

## 6.0 SCOPE OF ACTIVITIES

Site work procedures will include:

- Labor, materials, necessary permits, laboratory tests and reports.
- Soil borings and installation of temporary wells.
- Groundwater sampling.
- Soil Sampling, and,
- Disposal of waste generated by the project in accordance with applicable federal, state, and local regulations.

### 6.1 Groundwater/Soil Sampling

A total of forty-four (44) monitoring wells and sixteen (16) soil borings will be sampled and analyzed as part of the SOW. Each monitoring well will be purged using low-flow methods to establish stabilization parameters for the well. Each soil boring will be analyzed with a photo-ionization device (PID). The soil interval with the highest PID reading will be collected for analysis.

Each of the permanent monitoring wells will be sampled unless free product is present on the groundwater surface. If free product is present and thicker than 0.01 feet, a groundwater sample will not be collected, and dissolved oxygen measurements will not be collected.

Investigation derived waste (IDW) associated with purging and sampling of the permanent monitoring wells, and soil cores from the soil borings, will be containerized in 55-gallon drums. The samples analyzed as part of the assessment process will be used for waste characterization purposes. Based on the results of the analyses, the drums and their contents will be properly disposed of.

The groundwater samples from each monitoring well and soil samples from each soil boring will be submitted to a South Carolina certified laboratory for analysis. Industry standard quality assurance and quality control methods will be followed for shipping (sample labels, sealed sample containers, completed chain of custody forms, shipments to the laboratory on ice).

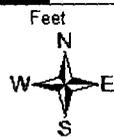
## **6.2 Reporting**

Following the completion of each task, a task specific report will be developed for that task in accordance with SCDHEC guidance documents. Distribution of reports will be in accordance with the submittal schedule presented in the SOW.

## Figures



0 500 1,000 2,000 3,000 4,000



Projection: Clarke 1866 UTM Zone 17N  
Map Scale: 1:18,000  
Created by: JWW, 9/5/2008  
Checked by: ECS, 9/5/2008

**Figure-1**  
**Site Location Map**  
Former CNC  
Charleston, South Carolina





0 500 1,000 2,000 3,000 4,000



Projection: Clarke 1866 UTM Zone 17N  
Map Scale: 1:18,000  
Created by: JWW, 9/5/2008  
Checked by: ECS, 9/5/2008

**Figure-1**  
**Site Location Map**  
**Former CNC**  
**Charleston, South Carolina**

**ADVENT**  
Environmental Planning & Design



Charleston Naval Complex

MUSC  
 171 Ashley Ave.  
 Charleston, SC 29425  
 (843) 792-2300

**Legend**

— hospital\_route

Projection: NAD 1927 UTM Zone 17N  
 Map Scale: 1:40,000  
 Created by: JWW, 10/06/05



**Figure-2**  
 Hospital Route Map  
 Former CNC  
 Charleston, South Carolina



**Appendix A**  
**Site Specific Health and Safety Plan**

**Appendix B**  
**Environmental Protection Plan**

**Appendix C**  
**ADVENT Work and Test Procedures**



DEPARTMENT OF THE NAVY  
BASE REALIGNMENT AND CLOSURE  
PROGRAM MANAGEMENT OFFICE SOUTHEAST  
4130 FABER PLACE DRIVE  
SUITE 202  
NORTH CHARLESTON, SC 29405

11011  
Ser BPMOSE kas/0049  
26 Jan 09

Ms. Susan Fulmer  
Northeastern South Carolina Corrective Action Section  
Underground Storage Tank Program  
South Carolina Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201-1708

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JAN 28 2009

LAND REVITALIZATION  
DIVISION - BLWM

Ms. Janice Cook  
AST Petroleum Restoration & Site Investigations Section  
Land Revitalization Division  
Bureau of Land and Waste Management  
South Carolina Department of Health and Environmental Control  
2600 Bull Street  
Columbia, SC 29201-1708

Subj: SUBMITTAL OF VARIOUS PLANS IN SUPPORT OF TANK ACTIONS AT THE CHICORA  
TANK FARM (#13350), RESERVE TRAINING CENTER (#13370), BUILDING 1279 (#15368),  
AND BUILDING 236 (#16459) AT THE CHARLESTON NAVAL COMPLEX, CHARLESTON, SC

Dear Ms. Fulmer and Ms. Cook:

The following documents are submitted in support of the project "Various Tank Actions, Chicora Tank Farm, Buildings 236, 1279, & the Reserve Training Center" at the Charleston Naval Complex, Charleston, SC:

1. Work Plan
2. Environmental Protection Plan
3. Quality Assurance/Quality Control Plan
4. Site Specific Health and Safety Plan

Should you have any questions, please contact me at 843-743-2134 or by email at [kathryn.stewart@navy.mil](mailto:kathryn.stewart@navy.mil).

Sincerely,

KATHRYN A. STEWART, P. E.  
BRAC Environmental Coordinator

Encls:

- (1) Work Plan
- (2) Environmental Protection Plan
- (3) Quality Assurance/Quality Control Plan
- (4) Site Specific Health and Safety Plan

**QUALITY ASSURANCE/QUALITY CONTROL PLAN  
FOR  
VARIOUS TANK ACTIONS AT THE CHICORA TANK FARM,  
BUILDINGS 236, 1279, AND THE RESERVE TRAINING CENTER**

**CHARLESTON NAVAL COMPLEX  
NORTH CHARLESTON, SOUTH CAROLINA**

**Prepared For:**



**BRAC Program Management Office, Southeast  
North Charleston, South Carolina**

**Contract Number:**

N62467-06-D-0125

**Task Order:**

0048

**Prepared By:**

ADVENT Environmental, Inc.  
498 Wando Park Blvd.  
Suite 500  
Mt. Pleasant, SC 29464

**RECEIVED**

JAN 28 2009

LAND REVENTION  
DIVISION - 211111

Prepared by: \_\_\_\_\_  
ADVENT-James W. Weeg, P.G.

Approved by: \_\_\_\_\_  
NAVFAC-Kathryn A. Stewart, P.E.

January 2009  
ADVENT Project 09-500

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## ACRONYM LIST

µg/L	Micro-grams per liter
API	American Petroleum Institute
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethyl-benzene, Xylenes
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CNC	Charleston Naval Complex
CRZ	Contamination Reduction Zone
CTF	Chicora Tank Farm
EDB	Ethylene Di-Bromide
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
GIS	Geographic Information System
IDW	Investigation Derived Waste
IGWA	Initial Groundwater Assessment
MCL	Maximum Contaminant Levels
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
MSDS	Material Safety Data Sheet
MtBE	Methyl tert-Butyl Ether
NAVFAC	Naval Facilities Engineering Command
PAH	Polynuclear Aromatic Hydrocarbons
PPE	Personal Protective Equipment
ppm	Parts Per Million
RBSL	Risk Based Screening Level
SCDHEC	South Carolina Department of Health and Environmental Control
SHSO	Site Health and Safety Officer
SOW	Scope of Work
SSHSP	Site Specific Health and Safety Plan

## 1.0 INTRODUCTION

ADVENT Environmental, Inc. (ADVENT) has prepared this site-specific Quality Assurance Project Plan (QAPP) for the Base Realignment and Closure (BRAC) Program Management Office (PMO), Southeast for sites located at the Charleston Naval Complex (CNC) located in North Charleston, South Carolina (Figure 1). General site plans identifying the five sampling locations are presented as Figures 2 through 6.

This plan identifies the Quality Assurance (QA) and Quality Control (QC) procedures that will be used to ensure that technical data generated during soil sampling and low flow groundwater assessment activities are accurate, complete and representative of actual field conditions. QA is defined as an integrative program designed to assure reliability of monitoring and measurement data. QC is defined as the routine application of procedures for obtaining prescribed performance standards for monitoring, measuring, and assessment data.

Guidance documents that were used to prepare this include:

United States Environmental Protection Agency (EPA), 2003: Quality Management Plan for EPA Region 4, May 2003,

EPA, July 1993: Draft Final - EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA QA/R5.

EPA, May 1993: Region V Model RCRA Quality Assurance Project Plan (QAPP).

EPA, 1996: Low-Flow (Minimal Drawdown Ground-Water Sampling Procedures, Ground Water Issue, (EPA/540/S- 95/504).

## **2.0 PROJECT DESCRIPTION**

The procedures described in this document were developed to allow ADVENT to evaluate the precision, accuracy, representativeness, and completeness of data obtained as a result of soil sampling and groundwater monitoring activities.

### **2.1 Objectives**

ADVENT's objectives for this project include:

- Perform assessment via a limited direct push technology (DPT) investigation at the CNC Reserve Training Center,
- Perform additional investigation, via twelve (12) soil borings, at the Chicora Tank Farm (CTF) in an attempt to further delineate the source of naphthalene that is present above the risk-based screening level (RBSL) at MW34-R,
- Perform two (2) rounds of semi-annual sampling and analysis on twenty-five (25) accessible monitoring wells at the CTF,
- Perform three (3) rounds of semi-annual sampling and analysis of the three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) located at Building 1279, and,
- Abandon three (3) monitoring wells at Building 236.

### **2.2 Scope of Work**

The project sites are located at the former CNC in North Charleston, SC and this work is being performed in support of the BRAC PMO SE. ADVENT will perform the following activities as outlined in the Statement of Work (SOW) dated December 10, 2008.

- Develop a Work Plan, Health and Safety Plan, Environmental Protection Plan, and a Quality Assurance/Quality Control Plan that encompasses the five work objectives;
- Perform assessment via a DPT investigation at the CNC Reserve Training Center,

- Perform additional investigation, via twelve (12) soil borings, at the CTF in an attempt to further delineate the source of naphthalene that is present above the RBSL at MW34-R,
- Perform two rounds of semi-annual sampling and analysis on twenty-five (25) accessible monitoring wells at the CTF,
- Perform three (3) rounds of semi-annual sampling and analysis of the three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) located at Building 1279, and,
- Abandon three (3) monitoring wells at Building 236, and,
- Provide reports as required in the SOW for each site at the completion of each field activity.

Procedures that will be used to accomplish these tasks are described in the Work Plan prepared by ADVENT and in following sections of this QA/QC Plan.

### **3.0 PROJECT ORGANIZATION AND RESPONSIBILITY**

Responsibilities of ADVENT personnel working on the project are as follows:

**Project Principal:** Kate Hendrickson Borg, CHMM. Provides overall project direction and responsibility for the project.

**Project Manager:** James Weeg, P.G. Makes certain that project objectives are fulfilled in a timely manner (including QA/QC objectives); coordinates activities with Subcontractors and CNC site personnel; and logistically manages the project.

**QA/QC Officer:** James Weeg, P.G. Designs, monitors, and evaluates the project's QA/QC program. Will review project data and will make recommendations to Project Manager on QA/QC issues.

**Field Geologist:** James Weeg, P.G. Responsible for monitoring soil borings and well sampling in accordance with the work plan, and any other field activities.

#### 4.0 QUALITY ASSURANCE OBJECTIVES

This quality assurance program is designed to ensure that the data collected during all phases of work are of sufficient quality to support decisions concerning corrective action measures. Quality Assurance (QA) program, policies, and written procedures (such as this QAPP) are established to assure appropriate personnel, equipment, and methods are used. Data Quality Objectives (DQOs) are used to set parameters and guidelines to evaluate data with respect to precision, accuracy, representativeness, completeness and comparability. Specific quality control (QC) measures are developed for both field and laboratory procedures to help assure data quality falls within these parameters and guidelines in order to meet the DQOs.

Precision is defined as the reproducibility of analyses under a given set of conditions. It will be generally measured through use of duplicate samples. A parameter such as the relative percent difference (RPD) will be used to evaluate the precision of a particular analysis. The actual acceptance value may be dependent on the particular analytical method used as well as the sample matrix.

Accuracy is a measure of bias in a measurement system and is defined as the agreement of a measurement with an accepted reference or true value. The difference between the measured and reference values will be expressed as a percentage. Acceptance criteria for this value, as the case for precision, are dependent upon the analytical method as well as the sample matrix.

Representativeness is the degree to which the data generated from a particular sample location accurately represent the population intended to sample. Proper planning will be initiated to insure data is representative with respect to the objectives of the sampling event.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that could be expected to be obtained under "normal" conditions. Data completeness will be determined by comparing requested analyses with reported analyses and assessing the sufficiency of the data reported in fulfilling project objectives.

For the former, the target completion rate is 100 percent, while the latter will be qualitatively assessed.

Comparability is the degree of confidence with which one data set can be compared to another. Throughout sampling on this project, standard methodologies will be used for both sampling and analysis activities to insure comparability. Provisions will be made to evaluate data generated by different laboratories or during different conditions.

## 5.0 DOCUMENTATION

Information relative to execution of project tasks while on site shall be recorded in a field notebook or on other information collection forms to document field activities and data collected. Records shall also be kept to document the transfer of possession of samples and other relevant data. Writing for records should be in water proof ink or pencil, and a single line shall be used to strike out errors. Records shall be reviewed for completeness by the generator and shall be retained as part of the project file.

### 5.1 Field Data Sheets

Standard field data forms shall be used when appropriate to record pertinent information. Examples of standard forms for sampling are included in Appendix A.

### 5.2 Field Notebook

A field notebook shall be used in conjunction with the field data forms to record information relevant to field activities. The purpose of the field notebook is to document the work performed and the field conditions in sufficient detail so that field activities could be reconstructed and can be interpreted without consultation of the field personnel. Information to be documented includes but is not limited to:

- Pertinent data not already included in standard Field Data Sheets such as location of the activity, sample identification, sample type (grab or composite), sample material (soil, sediment, water), analysis to be performed, time, result of field measurements, and specific handling information,
- Site name and location,
- ADVENT project number,

- ADVENT address and telephone number;
- Names of ADVENT personnel on site,
- Name and location of subcontractors including name of the on-site foreman,
- Field observations,
- Weather conditions,
- Description of equipment used,
- Description of procedures used (may reference quality assurance project plan, standard operating procedures manual, work plan, other appropriate document),
- Description of alternate procedures if used and rationale for use,
- Sample collection information,
- Decontamination procedures,
- Calibration of field equipment,
- Log of activities with time of each entry,
- Waste handling information (number of drums, location, contents, etc.), and,
- Signature of personnel recording the information.

### **5.3 Sample Identification**

In instances where samples must be collected for laboratory analysis or evaluation, documentation of the sampling event should be included in the field notebook, on sample collection forms, and on the appropriate laboratory paperwork. Sample labels will be attached to or affixed to each sample container. Labeling should be performed with water proof ink. The following information must be included on the sample container:

- Project Number,
- Field Identification or Sample Station Number,
- Date and time of sample collection,
- Designation of Sample (grab or composite),
- Depth of sample location,
- Initials of sampler,
- Preservatives added,
- Analyses to be performed, and,
- Relevant comments (highly toxic, odor, reactive, etc.).

#### **5.4 Chain of Custody**

Chain of Custody forms shall be prepared to document the transfer of possession of samples. Standard ADVENT Chain of Custody forms, such as the one included in Appendix A, or Chain of Custody forms provided by the contract laboratory will be used. The following information is required to complete the Chain of Custody:

- Project number and site location,
- Name and telephone number of individual completing the Chain of Custody,
- Identification, date, time, grab or composite, type (water, liquid, oil, solid), number of containers, analysis to be performed, and relevant remarks for each sample,
- Comments such as packing and shipping information, and,
- Signature, date and time of personnel relinquishing samples.

## **6.0 MATERIALS HANDLING AND SAMPLE CUSTODY**

Procedures for handling of equipment, samples, and waste materials are outlined in the following section. Field procedures will be performed in a manner that will minimize, as practicable, the handling of equipment and samples and the generation of decontamination and sampling waste.

### **6.1 Equipment**

The term 'equipment' in these procedures applies to both sampling equipment and containers unless otherwise noted. In field operations and transportation, clean equipment and used equipment should be adequately separated to prevent accidental use of exposed equipment. Equipment that is faulty shall be marked with a red tag identifying the observed problem and stored separate from serviceable and clean equipment.

Equipment used in work involving hazardous or toxic wastes/materials or waste streams shall be decontaminated prior to being placed in a vehicle or departing the site. At a minimum it shall be washed with laboratory detergent and rinsed with tap water.

Equipment shall be maintained in good operating condition according to the manufacturers' recommendations.

### **6.2 Samples**

A list of analytical methods for detection of potential constituents of concern is included in the Work Plan (Section 2.0). A list of sample containers including recommended preservatives and holding times for analytical methods is included as Table 1.

Labels and sample containers of adequate number and size containing required preservatives shall be provided by the contract laboratory in addition to ice chests for storage and transport of samples. Sample containers shall generally be filled leaving a

small amount of headspace. Samples for volatile organic compound analysis, however, shall be filled completely with no headspace remaining. Care should be taken to keep soil or other materials away from container threads so that an airtight seal can be achieved.

After collection, sample handling shall be minimized. Immediately after filling the sample container, the sample container shall be securely capped and labeled. Containers shall be placed inside plastic Zip-lock<sup>®</sup> bags and wrapped with packaging material such as plastic bubble wrap to reduce the potential for container damage during shipping. Containers shall be stored on ice immediately after collection and labeling, and shall be shipped in ice chests to the receiving laboratory with adequate ice to maintain appropriate temperature. Ice chests shall be secured with packaging tape and sealed with custody seals prior to shipment. Custody seals will be dated and signed by the sampler. The receiving laboratory should be consulted about sample shipping and delivery arrangements so that sample holding times will not be exceeded.

Sample containers filled with heavily contaminated material should be placed immediately into a Zip-lock<sup>®</sup> bag after collection, preservation, and identification. Samples with suspected heavy contamination shall be shipped separate from trace and ambient samples when practicable.

Samples must be maintained in a secure manner to maintain control over management of the sample conditions and to avoid tampering, vandalism, and other negative effects. Samples are considered secure if one of the following applies:

- They are in the hands of the project team or transferee, such as Federal Express,
- They are in clear view of the project team or the transferee,
- The project team or transferee secured them in a manner to prevent obvious tampering (i.e., locked truck, car, storage cabinet),

- They are placed in a designated secure area, or,
- Custody seals have been placed on the ice chest and remain intact.

### 6.3 Waste

Soil cuttings, purge water, spent solvent, rinse water and wash water shall be contained and collected in properly labeled containers. Portable storage tanks or 55-gallon drums shall be used to containerize these wastes. Solid waste shall be kept separate from liquid and miscellaneous materials such as disposable gloves, plastic sheeting, personnel protective equipment, tyvek, or other waste shall not be included. Miscellaneous waste shall be double bagged and disposed of as normal waste unless heavily contaminated materials have been encountered. Waste materials shall be left on site for disposal waste disposal contractor at a later date.

Potentially hazardous materials will be labeled appropriately until characterization of the waste is completed. Labels shall include:

- The generator name,
- Generator telephone number,
- Generator contact,
- Project number,
- Date of generation,
- Drum number (i.e. Drum 1 of 4), and,
- Description of contents, material type and source (i.e., wash water from sampling decontamination activities or soil cuttings from borehole drilling).

Waste that is known to be (by laboratory analysis) or suspected to be hazardous shall be containerized and brought to the immediate attention of the Project Manager for proper labeling and handling according to the South Carolina Department of Health and Environmental Control (SCDHEC) regulations.

## 7.0 CLEANING AND DECONTAMINATION PROCEDURES

Sampling equipment and other equipment involved in the sampling activities shall be cleaned and decontaminated before entering the site to minimize the potential of transporting potentially hazardous materials to the site from other sources.

The decontamination area shall be established for sample contacting and non-sample contacting equipment. The decontamination area should be located to minimize the distance to an appropriate water supply and the distance from the area being investigated in addition to minimizing the spread of potential contamination. The decontamination area should be located down-wind and down-gradient from the area where cleaned equipment is drying. The decontamination area is to be constructed to contain wash and rinse fluids. If required, a temporary decontamination pad will be constructed with plastic sheeting and a sump to contain and collect the fluids. Wash and rinse fluids from decontamination activities shall be containerized and stored as previously described.

Sampling equipment and other equipment shall be cleaned and decontaminated prior to leaving the site. Teflon<sup>®</sup> tubing, gloves, protective clothing, plastic sheeting and other disposable supplies shall be discarded and not reused.

Rinse waters, acids and solvents shall not be reused, except when used as soaking solutions for small objects and for objects heavily soiled with grease or oil. Equipment cleaned with these soaking solutions must be cleaned with freshly prepared solutions prior to a final rinse.

### 7.1 Definitions

Sample-contacting equipment:	Equipment which comes in direct contact with the sample. Examples include Teflon tubing, Horiba U22 flow through cell, etc.
Non-sample contacting equipment:	Equipment utilized during sampling activities which does not come in direct contact with the sample.

- Detergents:** Cleaning detergents will be a standard brand of phosphate-free detergent such as Liquinox. Alternatives to this type of detergent must be justified and approved prior to use and must be documented in field notebooks.
- Acid Washes:** Nitric acid solutions should be comprised of 10 percent reagent grade acid and deionized water.
- Solvents:** The standard cleaning solvent shall be pesticide-grade isopropanol. Other solvents such as pesticide-grade acetone or methanol are acceptable but caution must be used to avoid contaminating samples with equipment washed with these solvents. Use pesticide-grade hexane or petroleum ether only on equipment that is dry because these solvents are not miscible in water.
- Water:** Tap water from municipal water treatment systems is acceptable for wash and rinse solutions. Non-potable water from untreated sources is not suitable. Commercially purchased distilled water is acceptable for all initial rinses. Upgrading water quality during cleaning need not be documented but the water must be submitted to the same quality control measures as deionized water.

## **7.2 Field Cleaning Procedures for Sample Contacting Equipment**

Sample contacting equipment such as Horiba U22 flow through cell, interface probe, stainless steel trowel, etc. shall be decontaminated in the field using the following procedure.

1. Clean with tap water and laboratory detergent using a brush if necessary to remove particulate matter and surface film,
2. Rinse thoroughly with tap water,
3. Rinse thoroughly with deionized/distilled water,
4. Rinse twice with solvent (isopropanol unless otherwise noted),
5. Rinse thoroughly with organic-free water and allow to air dry as long as possible, and,

6. If organic-free water is not available, allow equipment to air dry as long as possible.

### **7.3 Field Cleaning Procedures for Non-Sample Contacting Equipment**

Non-sample contacting equipment shall be steam cleaned or washed with a power washer with tap water. An acceptable alternative is to wash thoroughly with hot non-phosphatic detergent solution and a brush and rinse thoroughly with tap water.

## **8.0 QUALITY CONTROL**

Quality control samples will be collected and field equipment will be calibrated throughout the field activities. Quality control samples will include trip blanks, equipment blanks, field blanks and duplicate samples.

### **8.1 Quality Control Samples**

Trip blanks will be prepared and provided by the contract laboratory prior to the sampling event. Trip blanks are to be stored with sample containers. They shall be packaged for shipment with the other sample containers for laboratory analysis. Trip blanks are not to be opened at any time by field personnel. Trip blanks are to be provided for each shipment of samples collected.

Equipment blanks will be collected as a check for cross-contamination between samples due to incomplete decontamination procedures. Equipment blanks shall be prepared by rinsing field-cleaned equipment with deionized water and collecting the rinse water in a sample container. An equipment blank shall be prepared to verify the adequacy of decontamination procedures for approximately every ten to twenty field samples collected for analysis, with a goal of at least one to be collected on each day of field sampling.

Field blanks will be collected to test for contaminant residues in cleaned laboratory sample containers or disposable sample containers by adding deionized water to a clean sample container. Approximately one such sample shall be analyzed for every ten to twenty field samples collected for analysis, with a goal of at least one to be taken each day that field sampling is performed.

Field duplicate samples will be collected as a check on the laboratory's accuracy and precision. Duplicate samples shall be prepared by placing sample material collected simultaneously from the same source under identical conditions into two separate sample

containers. One duplicate sample shall be analyzed for every ten to twenty field samples collected for analysis.

## **8.2 Calibration of Equipment**

Field equipment requiring calibration are the Horiba U-22 Field Parameter Device and MiniRAE 2000 PGM-7600 Professional PID Monitor. Calibration procedures are generally specific to each model and are not included in this document. Calibration shall be performed per the manufacturer's instructions and recommended schedule. The QA/QC Officer will audit the field notebook and other appropriate documentation to verify the calibration is being performed.

## **9.0 GROUNDWATER SAMPLING PROCEDURES**

The following ground-water sampling procedures provide methods for ground-water elevation measurements, well purging, and sample collection. Ground-water sampling protocols were developed from Test Methods for Evaluating Wastes (EPA SW-846), USEPA Region IV Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual.

### **9.1 Groundwater Monitoring Wells**

Ground-water monitoring wells (Category II, Category III, or Category IV wells) may be sampled to collect water quality data as well as ground-water elevation data.

### **9.2 Well Development**

Monitoring wells shall be developed prior to initial sampling. Water is extracted from the well to remove suspended sediment resulting from installation procedures. Development of the well will also flush the sand pack around the well screen, removing both water disturbed during drilling and soil fines while allowing formation water to enter the well. Development shall be performed no sooner than 24 hours after installation by air-lifting, pumping or hand bailing methods.

Development shall be considered complete when the water is visibly clear of suspended solids and indicator parameters such as temperature, pH, and specific conductance have stabilized.

Indicator parameters will be recorded following the removal of each well volume on a Monitoring Well Development Record (Appendix A). Development water shall be handled according to procedures outlined in this document.

### **9.3 Well Measurements**

Caution shall be used when opening each well to avoid fumes which may have accumulated and to prevent foreign materials from entering the well. Ground-water measurements and immiscible layer samples shall be obtained prior to initiation of purging and ground-water sampling activities according to the following methods.

#### **9.3.1 Groundwater Elevation**

Static ground-water levels will be measured after well installation and development and before sampling activities. All ground-water elevations shall be measured to the nearest 0.01 foot (from the well datum reference point) using an electric water level meter or a decontaminated chalked tape.

#### **9.3.2 Total Depth of Well**

A depth of well measurement shall be recorded to the nearest 0.01 foot and compared with the well depth from the well construction diagram. Total ground-water well volumes and sediment amounts will be calculated using this depth. The depth of sediment can be calculated as the difference between the constructed well depth and the depth recorded. The monitoring well shall be redeveloped according to development procedures described herein if more than three feet of sediment is encountered.

#### **9.3.3 Immiscible Layer Thickness**

Immiscible layer measurements will be obtained with an interface probe or pH sensitive coated tape. Immiscible layer measurement is obtained by lowering the probe slowly and recording the depths of the fluid interfaces.

#### **9.3.4 Immiscible Layer Sampling**

An immiscible layer shall be sampled, if present, prior to purging. Immiscible layers floating on top of the ground water having a thickness of two feet or more shall be

sampled by lowering a dedicated bottom check-valve bailer to the appropriate depth. Floating layers less than two feet in thickness shall be sampled with a peristaltic pump or using a modified top-filling bailer. Immiscible layers heavier than water shall be sampled using a dedicated double check-valve bailer. Samples shall be transferred to appropriate containers and labeled appropriately immediately after sampling. Sample containers should be placed in a Zip-lock<sup>®</sup> bag and placed in shipping containers immediately to provide secondary containment.

#### **9.4 Low-flow sampling Procedures**

Groundwater monitoring wells are purged for the following reasons: the presence of the air interface at the top of the water column resulting in an oxygen concentration gradient with depth, loss of volatiles up the water column, leaching from or sorption to the casing or filter pack, chemical changes due to clays seals or backfill, and surface infiltration.

##### **9.4.1 Purging Recommendations**

Low-flow purging should be done with the pump intake located in the middle or slightly above the middle of the screened interval. Placement of the pump too close to the bottom of the well could cause increased entrainment of solids which have collected in the well over time. Placement of the pump at the top of the water column for sampling is only recommended in unconfined aquifers, screened across the water table, where this is the desired sampling point. Low-flow purging has the advantage of reducing the potential for mixing of the overlying stagnant casing water with water originating from the formation in the screened interval.

The objective of low-flow purging and sampling is to pump in a manner that minimizes stress (drawdown) to the system to the extent practical taking into account established site sampling objectives. Typically, flow rates on the order of 0.1 – 0.5 L/min are used, but this is dependent on site-specific hydrogeology.

It is recommended that water quality indicator parameters be used to determine purging needs prior to sample collection in each well. Stabilization of parameters such as pH, specific conductance, dissolved oxygen (DO), oxidation-reduction potential (ORP), temperature, and turbidity should be used to determine when formation water is accessed during purging. Normally, the order of stabilization is pH, temperature, specific conductance, ORP, DO, and turbidity. ***Stabilization is achieved after all parameters have stabilized for three successive readings.*** Three successive readings should be within  $\pm 0.1$  for pH,  $\pm 3\%$  for conductivity,  $\pm 10$  mv for ORP, and  $\pm 10\%$  for turbidity and DO.

#### 9.4.2 Sampling Recommendations

Water samples should not be collected immediately following well development or purging. Sufficient time should be allowed for the groundwater flow regime in the vicinity of the monitoring well to stabilize and approach equilibrium.

Well purging is always necessary to obtain representative samples of water flowing through the geologic formations in the screened interval. Rather than using the general but arbitrary guideline of purging three casing volumes prior to sampling, it is recommended that an in-line water quality measurement device be used to establish the stabilization time for the previously listed parameters on a well-specific basis.

Upon reaching water level stabilization, pumping rate can be established by monitoring volume/time using a 1 Liter (L) graduated cylinder.

$$\frac{\text{Volume}}{\text{Time}} = \text{PumpingRate}(L / \text{min})$$

Data, including pumping rate, drawdown, and volume required for parameter stabilization,

can be used for designing and conducting subsequent sampling activities.

The following are recommendations to be considered before, during, and after sampling:

- Use low-flow rates (<0.5 L/min), during both the purging and sampling to maintain minimal drawdown in the well,
- Place the sampling device intake at the desired sampling point,
- Minimize disturbances of the stagnant water column above the screened interval during water level measurement and sampling device insertion,
- Make proper adjustment to stabilize the flow rate as soon as possible, and,
- Monitor water quality indicators during purging.

#### **9.4.3 Equipment Calibration**

Prior to sampling, all sampling devices and monitoring equipment should be calibrated according to the manufacturer's recommendations and the site QAPP. Calibration of pH should be performed with at least two buffers which bracket the expected range. *Dissolved Oxygen (DO) calibrations must be corrected for local barometric pressure readings and elevation.*

#### **9.4.4 Water Level Measurement and Monitoring**

A water level measuring device should be used which will least disturb the water surface in the casing. Well depth should be obtained from the well logs. Measuring to the bottom of the well casing will only cause re-suspension of settled solids from the formation and require longer purging times for turbidity stabilization. *Measure well depth after sampling is completed.* The water level measurement should be taken from a permanent reference point which is surveyed relative to ground elevation.

#### **9.4.5 Filtration**

Based on laboratory analysis methods, and parameters to be analyzed, it may be necessary to filter the sample. In-line filtration is recommended because it provides better consistency through less sample handling, and minimizes sample exposure to the atmosphere.

Filters must be pre-rinsed following manufacturer's recommendations. If there are no recommendations for rinsing, pass through a minimum of 1-liter of groundwater following purging, and prior to sampling.

#### **9.4.6 Sampling, Sample Containers, and Preservation**

Once parameter stabilization is reached, sampling can be initiated. If an in-line device is used to monitor water quality parameters, it should be disconnected or bypassed during sample collection. The same device should be used for sampling as was used for purging. Sampling should occur in a progression from least to most contaminated well, if this is known. Generally, volatile (e.g., solvents and fuel constituents) and gas sensitive (e.g.,  $\text{Fe}^{2+}$ ,  $\text{CH}_4$ ,  $\text{H}_2\text{S}/\text{HS}^-$ , alkalinity) parameters should be sampled first. The sequence in which samples for most inorganic parameters are collected is immaterial unless filtered (dissolved) samples are desired. Filtering should be done last and in-line filters should be used as previously discussed.

Water samples should be collected directly into the sample container from the pump tubing. Immediately after a sample bottle has been filled, it must be preserved as specified in the site QAPP.

## **10.0 DPT SOIL SAMPLING PROCEDURES**

The following DPT soil sampling procedures provide methods for analysis of soil samples using a PID and subsequent sample collection. DPT soil sampling protocols were developed from American Society for Testing and Materials (ASTM) Standard Guide for Direct Push Soil Sampling for Environmental Site Characterizations [ASTM D 6282-98(Reapproved 2005)].

### **10.1 Direct Push Soil Sampling**

Direct push methods of soil sampling are used for geologic investigations, soil chemical composition studies, and water quality investigations. Direct push soil sampling consists of advancing a sampling device into subsurface soils by applying static pressure, by applying impacts, or by applying vibration, or any combination thereof, to the above ground portion of the sampler extensions until the sampler has been advanced to the desired sampling depth. The sampler is recovered from the borehole and the sample removed from the sampler. The sampler is cleaned and the procedure repeated for the next desired sampling interval.

### **10.2 Apparatus**

A direct push soil sampling system consists of a sample collection tool, hollow extension rods for advancement, retrieval, and transmission of energy to the sampler, and an energy source to force sampler penetration. A solid barrel sampler will be used for collection of samples at the CNC sites.

Solid barrel samplers may be one piece or segmented. Sample liners should be used to facilitate removal of the sample from the solid barrel. Solid barrel samplers are generally assembled with a removable cutting shoe and a drive head. The shoe is manufactured to cut the sample to a slightly undersized diameter allowing it to pass into the sample liner with a minimum of side friction to reduce sample disturbance.

Sample liners are used to collect and store samples for shipment to laboratories, for field index testing of samples and for removing samples from solid barrel type samplers. Liners are available in plastics, Teflon™, brass, and stainless steel. Liner material selection often is based on the chemical composition of liner/soil to minimize sample reaction with liner. A general rule for liner selection is stainless steel for organic compounds and plastic for metals. Teflon™ may be required for mixed wastes and for long time storage.

### **10.3 Sample Collection**

At the completion of the sampling increment, remove the sampler from the borehole. Remove the filled sample liner from the barrel by unscrewing the shoe, cap the liner for laboratory testing or split open for field processing.

The CNC site soil borings will be field processed by inserting the sample per three (3) foot interval in a Ziploc® bag and allowing it to rest in the sealed bag for ten (10) minutes. A PID will be used to establish the concentration of VOC's present in the headspace of the bag. The interval with the highest PID reading will be collected in accordance with EPA Method SW-846 and submitted for laboratory analysis.

### **10.4 Equipment Decontamination**

Sampling equipment that will contact the soil to be sampled should be cleaned and decontaminated before and after the sampling event. Extension rods should be cleaned prior to each boring to avoid the transfer of contaminants and to ease the connecting of joints.

Sample liners should be kept in a sealed or clean environment prior to use. Reusable liners should be decontaminated between each use. All ancillary tools used in the sampling process should be cleaned thoroughly, and if contaminants are encountered, decontaminated before leaving the site.

## **10.5 Borehole Sealing**

All direct push boreholes will be sealed to minimize preferential pathways for containment of contaminant migration. State or local regulations may control both the method and the materials for borehole sealing. Regulations generally direct bottom up borehole sealing as it is the surest and most permanent method for complete sealing.

A grout slurry mix will be used to seal boreholes at all CNC sites. The slurry will be mixed to standard specifications prescribed by SCDHEC regulations. The slurry will be pumped through an extension/drive rod until it appears at the surface of the outer casing.

## 11.0 WASTE SAMPLING PROCEDURES

The following waste sampling procedures provide methods for open and closed container sampling, and surfaces sampling. Waste sampling techniques were developed from the USEPA Region V Environmental Compliance Branch Standard Operating Procedures and Quality Control Manual.

Open containers will be sampled using a coliwasa sampler. The coliwasa sampler is a single use glass sampler, consisting of an outer glass tube with one end tapered, and a separate inner glass tube with a small bulb on one end. In use, the outer tube is slowly lowered into the drum, tapered end first. The inner glass tube is inserted (bulb end first) into the outer tube. This may be done very slowly after the outer tube is fully inserted into the drum, or the inner tube may be inserted prior to immersing the outer tube. In the latter case, the bulb tip of the outer tube must be pulled back several inches from the tapered end of the outer tube. After both inner and outer tubes are inserted into the drum to be sampled, the inner tube bulb end is pressed gently against the tapered end of the outer tube, forming a seal. Both tubes are withdrawn from the drum and the ends of the tubes are held over the sample container for discharge.

Samples from drums can also be collected using a four-foot length of glass tube. In most instances, glass tubes with a 1/2-inch or less inside diameter work best. The tube is inserted into the opening of the drum or barrel as far as possible. The open end is then sealed either with the thumb or a rubber stopper to hold the sample in the tube while removing the tube from the container. The sample is then placed in the appropriate container, and the procedure is repeated until an adequate amount of sample is collected.

Closed containers or drums containing unknown material or known hazardous materials shall not be opened by ADVENT personnel. Due to the risk of toxicity, explosion, and fire, such containers will be handled by only specially trained personnel.

## 12.0 ANALYTICAL PROCEDURES

Pace Analytical of Huntersville, North Carolina (or another certified laboratory) will perform laboratory organic chemical analyses using gas chromatography/mass spectrometry (GC/MS) according to EPA Methods as described in SW-846. Analytical methods that may be used include EPA Methods 8011 (EDB); 8260B (Volatile Organic Compounds); and 8270C (Semi-Volatile Organic Compounds).

The laboratory will base their analytical QA/QC procedures on EPA method manuals and their own laboratory's specific QA/QC procedures, which includes as a minimum, method blanks, method calibration standards, and method or matrix spike recoveries. Detection limits may be affected as result of matrix effects and with analyte dilution. The reported method detection limit for each analyte will not be greater than the Practical Quantification Limit (PQL) reported in the November 1986 edition of "Test Methods for Evaluating Solid Waste." The laboratory will report actual detection limits obtained during chemical analyses. If detection limits are increased as a result of matrix effects and/or elevated concentrations of one or more analytes, the sample will be reanalyzed with an appropriate dilution. The appropriate dilution will be determined by the laboratory with the goal of achieving identified PQL's.

### **13.0 DATA REDUCTION, VALIDATION, AND REPORTING**

Data collected during all phases of the project will be checked, validated and reduced before inclusion in reports. Field analytical data will be appropriately checked, validated, and included in the database prior to data reduction and QA/QC evaluations.

Data tracking, transfer, reformatting, and analysis can be carried out electronically. This procedure eliminates human transcription errors in addition to providing hands-on data retrieval, manipulation, and evaluation capabilities. When electronic data transfer is not possible, an ADVENT staff member will key in reported laboratory data to the database. Another ADVENT staff member will check that manually keyed-in data are correct before they are reduced and reported. Key data that cannot be validated will be brought to the attention of the Project Manager.

Field and analytical data is reviewed by task leaders for precision, accuracy and completeness (as relevant), prior to entry into the project database. Project data are stored in an electronic database as required for access by authorized project staff. A draft report of the new data for entry is prepared by the database manager and reviewed against original input by staff designated by the respective task leaders. Any comments or required revisions are noted on the draft report, and are incorporated prior to entry into the secured database proper. Access to the secured database is authorized by the Project Manager.

#### **13.1 Field Measurement Data**

Senior personnel will validate data obtained from field measurements by checking procedures used in the field and comparing current measurements with historical data. To allow comparison of data from different data collection events, results are reported in the same units. These units are identified below for various parameters.

- pH - Field measurements will be reported to 0.1 standard pH units,

- Electrical conductivity - Field measurements will be reported to 10  $\mu$ mhos/cm,
- Ground-water elevations - Field measurements will be reported to the nearest 0.01 foot,
- Flow rates - Rates will be reported to 0.1 liters per minute, and,
- Locations of sampling sites - Locations of monitoring wells will be marked on aerial photographs and/or facility maps.

### 13.2 Laboratory Analytical Data

Calculations performed by the laboratories for reporting chemical concentrations will be performed according to the procedures specified for each referenced method of analysis. Calculations conducted by analytical laboratories in converting raw data to reported results must be readily available for inspection. The accuracy and correctness of any data reported by the laboratory must be checked by senior laboratory personnel prior to their reporting the results.

ADVENT will validate analytical data after they have been entered into the database and prior to their inclusion in any reports or calculations. Data validation involves specific procedures for evaluating and/or calculating data precision, accuracy, and completeness. These chemical data validation procedures are provided in Section 13.0 of this document.

Data values that are much different from most other values in the same data set can be referred to as an "outlier". Outliers may reflect possible errors in the data or in their transcription to the data file. The task leaders will identify possible outlier values and attempt to correct them if the cause of the problem can be documented (i.e., transcription errors or inconsistent methodology). If the outlier values cannot be corrected, then all uses of data shall be qualified with any information regarding the potential outlier investigation.

If poor laboratory performance is evident, based on the precision of accuracy evaluations, or based on detectable chemical concentrations in field blank samples, the QA/QC officer

will notify the laboratory and the laboratory will take the appropriate corrective action. Corrective action will include, but not be restricted to, analysis and reporting of laboratory blanks, sample re-analysis, and duplicate sample analysis by another laboratory. The QA/QC Officer will make recommendations to the Project Manager as to any additional action which ADVENT should take, such as re-sampling or modification of the sampling or analytical protocol or frequency. The Project Manager will decide what additional action, if any, will be taken.

## **14.0 QUALITY CONTROL CHECKS**

Field and laboratory QC checks will be used to evaluate laboratory analytical procedures. The QC checks involve introduction of control samples into the sample analysis stream in an effort to evaluate the accuracy and precision of the sampling and analysis program.

### **14.1 Field Quality Control Checks**

Field QC checks entail field-collection of control samples to be introduced blind to the laboratory. Laboratory-prepared trip blanks, equipment rinsate blanks, and duplicates are the types of field QC samples that are planned to be used. The samples will be appropriately identified in the field log book. QC samples will be assigned a unique number which will not indicate to the laboratory that they are control samples.

#### **14.1.1 Laboratory-Prepared Trip Blanks**

Laboratory-prepared trip blanks will be obtained from the laboratory and carried into the field in the same sample storage coolers to be used for other ground water samples. At least one laboratory-prepared trip blank sample per each type of requested analytical method will be submitted for analysis in each site assessment phase, quarterly or semi-annual sampling program. The trip blanks will be listed as the first sample on the Chain-of-Custody form when submitted with a batch of samples. The laboratory-prepared trip blanks are intended as a check on the occurrence of cross contamination that may occur as a result of field handling or laboratory handling procedures.

#### **14.1.2 Equipment Rinsate Blanks**

Equipment rinsate blanks will be collected immediately prior to the collection of field samples by pouring organic-free or metals-free water supplied by the laboratory into or across the sampling equipment and filling the appropriate sample containers with this water. Approximately one equipment rinsate blank per analytical method per day of field

sampling will be submitted to the laboratory for analysis. Additional equipment rinsate blanks may be collected at the sampler's discretion.

### **14.1.3 Duplicates**

A minimum of one duplicate sample will be collected per analysis per every ten to twenty field samples. Field duplicate samples will be analyzed by the contract laboratory for verification if analytical results seem inconsistent with prior data.

## **14.2 Laboratory Quality Control Checks**

Laboratory quality control checks will be conducted as follows:

- Duplicates, spikes, and blanks will be analyzed on at least 10 percent of the total samples submitted for analysis,
- Method blanks will be performed for either every ten samples or for every batch of samples analyzed, whichever is more frequent,
- Surrogates and internal standards will be added to each individual sample when applicable, and,
- Spikes will be conducted on a matrix for water samples.

Each laboratory follows its own internal QA/QC procedures during routine operations. ADVENT will review and approve these procedures prior to utilizing a laboratory for this project. Each laboratory's QA/QC manual will be kept in the project file.

## 15.0 QUALITY ASSURANCE AUDITS

Field personnel will participate in periodic internal performance and system audits conducted by the Project Manager and QA/QC Officer. Internal audit by the QA/QC officer will also include evaluation of QC data and validation of all data collected at every phase of the investigation, following the procedures identified in this document. Internal laboratory performance and system audits will be conducted according to the specification of the analytical laboratories.

Laboratory performance and procedures will be externally audited by the QA/QC Officer, in addition to other external audits required of the laboratories for certification or enlisting for various programs.

### 15.1 Field Personnel Performance

The Project Manager, QA/QC Officer, or Project Principal will randomly observe field staff to ascertain adherence to the sampling protocols described in this QAPP, ADVENT's Standard Operating Procedures (SOP), and the Work Plan, and will conduct at least one field inspection during the execution of the work activities for each new major phase of work. Deviations from the defined field protocols, as stated in this QAPP, SOP, or Work Plan, or any procedures that might compromise the quality of data obtained in the field, will be reported by the field geologist or engineer to the Project Manager, who will decide what appropriate action should be taken.

### 15.2 System Audits

The QA/QC Officer will perform periodic system audits to evaluate the following:

- Appropriateness of well design for the Facility and intended project objectives;
- Effect of sampling protocols on data quality and validity;

- Significance of sample custody and handling methods for sample integrity;
- Sample and data tracking and documentation procedures in data checking and validation, field sampling and analytical methodologies;
- Appropriateness of the chemical analysis method; and
- Sufficiency and appropriateness of quality control checks for assuring data quality.

The QA/QC Officer will prepare a summary of the system audit for presentation to the Project Manager.

### **15.3 Quality Control Check Programs**

The QA/QC Officer is responsible for validating all data, according to the evaluation steps described in this document. The comprehensive data validation requirements are to be fulfilled before data are included in any reports. Every report will contain QC and QA sections.

## 16.0 PREVENTIVE MAINTENANCE

Equipment operation will be routinely checked and maintained to minimize breakdowns in the field. Calibration procedures will check the proper functioning of field instrumentation. Non-functional equipment will be removed from service. Information pertaining to this action will be entered into the daily field log. The equipment will be repaired or replaced and the time and date of its return to service noted in the daily field log. A field pH meter will be calibrated at the beginning of each ground-water sampling day.

## **17.0 PROCEDURES FOR VALIDITY ASSESSMENT OF CHEMICAL DATA**

This section summarizes the Quality Assurance/Quality Control (QA/QC) protocols for assessing the validity of the reported chemical data. Also included are diagnostic procedures for identifying possible sources of errors and appropriate corrective actions for data validation.

### **17.1 Data Validation Procedures**

ADVENT's QA/QC Officer or qualified designee will evaluate chemical data using quantitative statistical tests, qualitative assessment, and professional judgment to ensure that the data received are representative of actual field conditions. The analytical results will first be checked for completeness, including the analytical method sensitivity (reported detection limit) from one sampling round to another and for an entire sampling plan. Thereafter, blanks, duplicates, and spikes (quality control samples) will be evaluated for contamination, data precision, and data accuracy, respectively.

Sample results will be compiled and summarized for relevant compounds and those found at concentrations above their detection limits using a database management system. Where direct electronic data transfer is not used in data compilation, hard copies of the summarized data will be edited for errors following data keying and during formatting.

Analytical results for ground water from wells sampled more than once (i.e., periodic monitoring of ground-water quality) will be assessed on a compound-by-compound basis and tested statistically for variations. Any significant variations will be evaluated for changes in the ground-water sampling and/or laboratory analytical procedures, data randomness or changes in ground-water quality with time.

Data completeness is tracked and checked by the Project Manager. The completion of all analyses requested in the Chain-of-Custody form and additional analyses request forms is checked by tracking the status of each sample being analyzed. Tracking is maintained until all samples have been analyzed and the results are reported by the analytical

laboratory and received by ADVENT's QA/QC Officer. In addition, the detection limits reported for all data will be screened for possible unacceptably high limits and comparability from one sampling round to another.

Laboratory data will be reduced and summarized on a database system. Laboratory results will either be electronically imported or manually keyed into the database. Compounds reported as present at concentrations above detection limits will be summarized in an historical water-quality table. This table will also contain the following information: laboratory name, sample number, laboratory number, sampling date, field measurement and quality control samples analytical data.

## **17.2 QA/QC Evaluation and Data Validation**

Both field and laboratory quality control samples will be evaluated to assess the representativeness of ground-water and soil analytical results. Blank samples will be used to determine if and where any field samples may have been contaminated and the significance of any such contamination. Duplicate samples will be used to assess the precision of the analytical procedure as well as the inherent variability within the sampling region. Spiked samples will be used to determine the effect of matrix solutions and analytical preparation solutions on the analyte, and whether degradation, decay, or transformation has compromised sample integrity. Simple statistical parameters and qualitative indicators will be used in validating data.

### **17.2.1 Blanks**

Blanks are good indicators of possible sample contamination. Samples may be contaminated before, during, and after field sampling. Commonly, this results from container contamination before field sampling occurs. After field sampling, samples may be contaminated during shipping and sample custody prior to analysis and during laboratory chemical analysis. To be able to isolate the stage at which sample contamination may have occurred, up to three types of blank samples may be collected,

namely: trip blank, equipment rinsate blank and field blank. These blanks and the frequency of obtaining them for this project are discussed in Section 8.0.

### **17.2.2 Duplicates**

Duplicates are samples used to estimate data precision and variability within the sampling region. The two types of duplicates to be analyzed are field duplicates and laboratory splits. Field duplicates are samples collected from the same sampling location, following the same sampling protocol, one after the other. Duplicate samples may be submitted to one laboratory, so long as they are blindly labeled, for intra-laboratory comparison, or one of the duplicate samples may be sent to a designated quality control laboratory for inter-laboratory comparison. Laboratory splits are samples divided into two halves by the laboratory prior to their analysis.

### **17.2.3 Spikes**

Spike sample results allow the accuracy of the analytical and sample handling methodologies to be assessed. Laboratory spikes may be conducted on matrix solutions and/or laboratory blanks. Laboratory results of spike samples analyzed will be summarized and reported at the end of every phase of work.

## **17.3 QA Criteria and Evaluation Procedures for Control Samples**

Data will be evaluated by a comprehensive evaluation of blanks, spikes, and duplicates data for contamination, accuracy, and precision, respectively.

### **17.3.1 Blanks**

Blank results will be evaluated qualitatively. Any compound detected above detection limits in any of the blank samples will also be checked for in trip blanks and field blanks prepared during the same sampling event, or analyzed using the same equipment and on the same day(s) the method (laboratory) blanks are analyzed. Corrective action for blank

results shall include, but not be limited to flagging of data within the soil/water quality database as suspect or for qualitative use only, modification of decontamination procedures, and re-analysis of samples. However, under no circumstances will sample results be deleted or removed from the database.

### **17.3.2 Duplicates and Spikes**

Spike results will be evaluated for accuracy and expressed as spiked percent recovery (SPR) for each spike compound. The SPR is the difference in concentration between the total concentration in the spike sample and the original concentration in the sample, divided by the actual spike concentration added to the sample. Steps for duplicate and spike sample data validation procedures are identified in the following section.

Duplicate results will be statistically evaluated for data precision using the relative percent difference (RPD) values computed from the raw data reported. RPD is the difference in concentrations between field duplicates and/or laboratory splits, divided by their average concentration, expressed as a percentage. The standard deviation for groups of duplicate data may be computed. One of the following statistical testing and acceptance criteria will be selected and applied:

1. Pre-selected upper warning and control limits (UWL and UCL, respectively) and lower warning and control limits (LWL and LCL) may be used to assess ground-water data when historical water-quality control data for the Facility under investigation are insufficient. The warning limits are cautionary indicators that results should be closely evaluated prior to data validation. Control limits indicate poor data quality. These pre-selected UWL and UCL are based on those imposed for the EPA contract laboratory program. For duplicate results expressed as RPD, the only applicable limits, the UWL and UCL, are set at 50 and 100 percent respectively, except when compounds are detected near the reporting limit. For surrogate or spike percent recovery, the UWL and UCL are set at 125 and 150 percent, respectively. Hence, the LWL and LCL are 75 and 50 percent, respectively.
2. The UWL, UCL, LWL and LCL are computed from the historical quality control duplicate and spike data. The control limits (CLs) are

ideally at the 95 percent confidence interval for a one-tailed normal distribution for duplicate results expressed as RPD, and two-tailed normal distribution for spike results expressed as SPR. The CL value for half of a bell-shaped curve is 2.77 of the standard deviation or standard error, depending on the applicable parameter. It will, however, be approximated as three times the standard deviation for statistical testing. The warning limits (WLs) are two-thirds of the UCL, hence twice the standard deviation.

3. Other tests for statistical significance, such as Student's t-test, F-test, or chi-test, may be selected and applied as appropriate.

## 18.0 CORRECTIVE ACTION

If questionable data are detected during the QA/QC data review and validation, then QA/QC corrective action may be required. Criteria for determining when corrective action is required for chemical analyses are discussed in this document. The procedure for implementing corrective action in the case of questionable laboratory data is also identified in this document. Corrective action in a case of questionable laboratory data might include analyzing additional blank or duplicate samples, if available; re-checking laboratory calculations and chromatograms; re-sampling; modifying the sampling and/or analytical protocol; or other measures. The QA/QC Officer will make recommendations for corrective action to the Project Manager, who will decide what action, if any, will be taken.

The procedure for evaluating the need for and implementing corrective action in the case of the field program is identified in this document. The Project Manager will decide when corrective action is needed and what type of action is appropriate on a case-by-case basis.

The results of QA/QC audits and/or data review will be routinely included in summary project reports.

## 19.0 REFERENCES

American Society for Testing and Materials (ASTM) D 6282-98 (Reapproved 2005):  
Standard Guide for Direct Push Soil Sampling for Environmental Site  
Characterizations

ADVENT Environmental, Inc. (July, 2008): Work Plan for Monitored Natural  
Attenuation at Buildings 1279 and 236 and Corrective Action Plan and  
Groundwater Monitoring, Chicora Tank Farm; Charleston Naval Complex, North  
Charleston, South Carolina

Code of Federal Regulations (CFR)

29 CFR 1926 Safety and Health Regulations for Construction

South Carolina Department of Health and Environmental Control

R.61-71 South Carolina Well Standards, April 26, 2002

R.61-92, Part 280 Underground Storage Tank Control Regulations, May 23, 2008

South Carolina Risk Based Corrective Action for Petroleum Releases, May 15,  
2001

Initial Groundwater Assessment Guidance Document, March 15, 2000

Tier II Assessment Guidance Document, March 15, 2000

United States Environmental Protection Agency (EPA), 2003: Quality Management Plan  
for EPA Region 4, May 2003.

United States Environmental Protection Agency (EPA), July 1993: Draft Final - EPA  
Requirements for Quality Assurance Project Plans for Environmental Data  
Operations, EPA QA/R5.

United States Environmental Protection Agency (EPA), May 1993: Region V Model  
RCRA Quality Assurance Project Plan (QAPP).

United States Environmental Protection Agency (EPA), 1996: Low-Flow (Minimal  
Drawdown Ground-Water Sampling Procedures, Ground Water Issue, (EPA/540/S-  
95/504).

## Tables

**Table-1**  
**Summary of Sample & Preservation Requirements**

<b>Site</b>	<b>Parameter</b>	<b>Method</b>	<b>Container</b>	<b>Preservatives</b>
Bldg 1279, CTF, RTC	VOC's + Naphthalene	8260	3x40mL Vials	pH<2 HCl
CTF, RTC	SVOCs	8270	Glass, 1000 mL	None
CTF	EDB	8011	3x40mL Vials	None

*CTF = Chicora Tank Farm*

*RTC = Reserve Training Center*

*VOC = Volatile Organic Compound*

*SVOC = Semi-Volatile Organic Compound*

*EDB = Ethylene Di-Bromide*

*HCl = Hydro-Chloric Acid*

## Figures



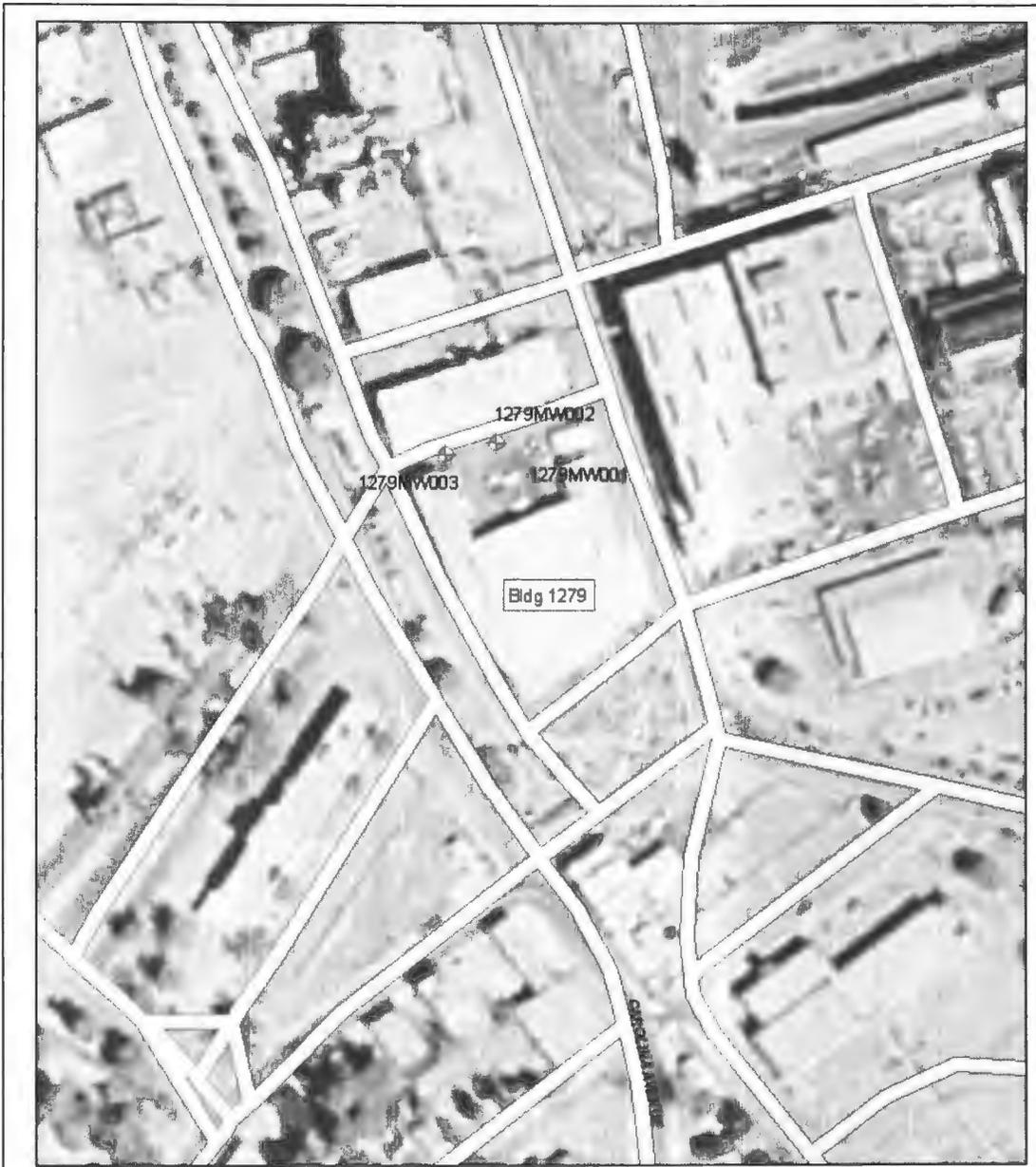
0 500 1,000 2,000 3,000 4,000



Projection: Clarke 1866 UTM Zone 17N  
Map Scale: 1:18,000  
Created by: JWW, 01/21/09  
Checked by: KHB, 01/21/09

**Figure-1**  
**Site Location Map**  
**Charleston Naval Complex**  
**Charleston, South Carolina**





**Legend**

Monitoring Wells

Projection: Clarke 1866 UTM Zone 17N  
 Map Scale: 1:3,000  
 Created by: JWW, 01/21/09  
 Checked by: KHB, 01/21/09



**Figure-2**  
**Generalized Site Plan for Building 1279**  
**Former CNC**  
**Charleston, South Carolina**



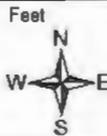


**Legend**

Monitoring Wells

Projection: Clarke 1866 UTM Zone 17N  
 Map Scale: 1:3,000  
 Created by: JMW, 01/21/09  
 Checked by: KHB, 01/21/09

0 75 150 300 450 600



**Figure-2**  
 Site Map/ Concentration Data Bldg-236  
 Charleston Naval Complex  
 Charleston, South Carolina





**Legend**

-  Monitoring Wells
-  Site Boundary

Projection: NAD 1983 UTM Zone -17N  
 Map Scale: 1:1,000  
 Created by: JWW, 01/21/09  
 Checked by: KHB, 01/21/09



**Figure 4**  
**Generalized Site Plan**  
 Chicora Tank Farm, CNC  
 North Charleston, SC





0 265 530 1,060 1,590 2,120



Projection: Clarke 1866 UTM Zone 17N  
Map Scale: 1:18,000  
Created by: JWW, 01/21/09  
Checked by: KHB, 01/21/09

**Figure-5**  
**Generalized Site Plan**  
**Reserve Training Center**  
**Charleston Naval Complex**  
**Charleston, South Carolina**



**Appendix A**  
**Field Sampling Forms**

**Appendix B**  
**ADVENT Standard Operating Procedures**

# **SITE-SPECIFIC HEALTH & SAFETY PLAN**

**VARIOUS TANK ACTIONS AT THE CHICORA TNK FARM, BUILDINGS 236,  
1279, AND THE RESERVE TRAINING CENTER**

**CHARLESTON NAVAL COMPLEX  
NORTH CHARLESTON, SOUTH CAROLINA**

**Prepared for:**



**BRAC Program Management Office, Southeast  
North Charleston, South Carolina**

**Contract #: N62467-06-D-0125  
Contract Task Order # 0037**

**RECEIVED**

JAN 28 2009

LAND REVI... DIVISION - CLAM

**Prepared by:**



**ADVENT Environmental, Inc.  
498 Wando Park Blvd., Suite 500  
Mt. Pleasant, South Carolina 29464**

**January 2009**

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## LIST OF ACRONYMS

AEDA.....	Ammunition, Explosives, and Dangerous Articles
AHA.....	Activity Hazard Analyses
AIDS.....	Acquired Immunodeficiency Disease
BIP.....	BlowInPlace
BRAC.....	Base Realignment and Closure
CFR.....	Code of Federal Regulation
CNC.....	Charleston Naval Complex
COC.....	Chemicals of concern
CRZ.....	Contamination Reduction Zone
CTF.....	Chicora Tank Farm
dBA.....	A Weighted Scale
demil.....	Demilitarization
DDESB.....	Department of Defense Explosive Safety Board
DU.....	Depleted Uranium
□C.....	Degrees Celsius
□F.....	Degrees Fahrenheit
EMA.....	Emergency Management Agency
EMM.....	Earth-Moving Machinery
EMS.....	Emergency Response Service
EPA.....	Environmental Protection Agency
ERCP.....	Emergency Response Contingency Plan
EV.....	Electron Volt
EZ.....	Exclusion Zone
F/B.....	Flash/Bang
HHCOC.....	Human Health Constituents of Concern
HSM.....	Health and Safety Manager
IP.....	Ionization Potential
LEL.....	Lower Explosive Limit
MEC.....	Munitions and Explosives of Concern
Mg/m3.....	milligrams per cubic millimeter
MHR.....	Maximum Heart Rate
Mph.....	Miles Per Hour
MPPEH.....	Materials that Present a Potential Explosive Hazard
MSDS.....	Material Safety Data Sheet
NIOSH.....	National Institute of Occupational Safety and Health
NRR.....	Noise Reduction Rating
O2.....	Oxygen
OB/OD.....	Open Burn/Open Detonation
OE.....	Ordnance and Explosives
OSHA.....	Occupational Safety and Health Administration
OWS.....	Oil/water separator
PEL.....	Permissible Exposure Limit
PID.....	Photoionization Detector

PM.....Project Manager  
POC.....Point of Contact  
ppm.....Parts Per Million  
PPE.....Personal Protection Equipment  
RCWM.....Recovered Chemical Warfare Material  
SS/SHSO.....Site Supervisor/Site Health and Safety Officer  
SSHSP.....Site-specific Health and Safety Plan  
SOP.....Standard Operating Procedures  
SUXOS.....Senior Unexploded Ordnance Supervisor  
SWMU.....Solid Waste Management Unit  
TLV.....Threshold Limit Value  
TWA.....Time Weighted Average  
UEL.....Upper Explosive Limit  
USACE.....United States Army Corp of Engineers  
USCG.....United States Coast Guard  
USN.....United States Navy  
UV.....Ultraviolet  
UXO.....Unexploded Ordnance  
UXOSO.....Unexploded Ordnance Safety Officer

### SITE-SPECIFIC HEALTH AND SAFETY PLAN APPROVAL

I have read and approve this Site-specific Health and Safety Plan (SSHSP) document for Various Tank Actions at the Chicora Tank Farm (CTF), Buildings 236, 1279, and the Reserve Training Center located at the Charleston Naval Complex (CNC), North Charleston, South Carolina with respect to project hazards, regulatory requirements, and ADVENT Environmental, Inc. procedures.

  
Approved by: \_\_\_\_\_  
Chris Brown  
Health and Safety Manager

Date: 01/20/09

  
Approved by: \_\_\_\_\_  
James Weeg, PG  
Project Manager

Date: 01/20/09

  
Approved by: \_\_\_\_\_  
Kate Hendrickson Borg, CHMM  
Project Principal

Date: 01/20/09

## **1.0 INTRODUCTION**

### **1.1 Objective**

The objective of this plan is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

### **1.1 Policy Statement**

The policy of ADVENT is to provide a safe work environment for all employees. ADVENT considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency and shortcuts. At ADVENT, it is believed all accidents and injuries are preventable. ADVENT will take reasonable steps to reduce the possibility of injury, illness, or accident.

This SSHSP prescribe the procedures that must be followed during referenced site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager and ADVENT's Health and Safety Manager.

The provisions of this plan are mandatory for all ADVENT personnel assigned to the project. Visitors to the site must also abide by the requirements of the SSHSP. ADVENT will provide this SSHSP to subcontractors for informational purposes only. All subcontractors must develop their own SSHSP that addresses all of the elements of this SSHSP. At a minimum, subcontractors will be responsible for designing and implementing their own SSHSP which does not conflict with ADVENT's plan, prior to initiating work on the project site. A copy will be provided to ADVENT for informational purposes.

### **1.3 References**

This SSHSP complies with applicable Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), and ADVENT Environmental Health & Safety policies and procedures. This plan follows the guidelines established in the following:

- ◆ Standard Operating Safety Guides, EPA (Publication 9285.1-03, June 1992).
- ◆ Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, EPA (86 116, October 1985).
- ◆ Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- ◆ Title 29 of the Code of Federal Regulations (CFR), Part 1926.

- ◆ Health & Safety Policies and Procedures, ADVENT Environmental.

#### **1.4 Disclaimer**

The following SSHSP has been designed for the methods presently contemplated by ADVENT Environmental Inc. for execution of the proposed work. Therefore, the SSHSP may not be appropriate if the work is not performed by or using the methods presently contemplated by ADVENT. In addition, as the work is performed, conditions different from those anticipated might be encountered and the SSHSP may have to be modified. Therefore, ADVENT only considers this SSHSP to be adequate for currently anticipated activities and conditions.

## **2.0 SITE HISTORY/SCOPE OF WORK**

### **2.1 Work Location/Background**

The project sites are located at the former CNC in North Charleston, SC. ADVENT will conduct two DPT investigations, additional sampling activities at buildings 1279 and the CTF, and abandon three monitoring wells at Building 236.

### **2.2 Scope of Work**

ADVENT will:

- Perform assessment via a limited direct push technology (DPT) investigation at the CNC Reserve Training Center,
- Perform additional investigation, via twelve (12) soil borings, at the CTF in an attempt to further delineate the source of naphthalene that is present above the risk-based screening level (RBSL) at MW34-R,
- Perform two rounds of semi-annual sampling and analysis of the twenty-five (25) accessible monitoring wells at the Chicora Tank Farm (CTF),
- Perform three (3) rounds of semi-annual sampling and analysis of the three (3) monitoring wells (1279MW001, 1279MW002, and 1279MW003) located at Building 1279, and,
- Abandon three monitoring wells at Building 236.

Purge water and decontamination water, if generated, will be containerized in 55-gallon drums. Data resulting from analyses performed on samples collected during the groundwater sampling will be used for waste characterization. The material will be shipped to a permitted waste disposal facility. Waste classified as PPE, disposable suits, gloves, boots, respirator cartridges, and plastic sheeting will be disposed of as non-regulated solid waste.

### **3.0 KEY PERSONNEL AND MANAGEMENT**

The Project Manager (PM), Site Supervisor/Site Health and Safety Officer (SS/SHSO), the Health and Safety Manager (HSM), and the Project Principal are responsible for formulating and enforcing health and safety requirements, and for implementing this SSHSP. The following summarizes the health and safety responsibilities of the site management.

#### **3.1 Project Safety Responsibilities**

The Project Principal has the overall responsibility for the project. The PM has overall day to day responsibility for the health and safety aspects of the project and assures that the requirements of the contract are attained in a manner consistent with the SSHSP requirements. The PM will coordinate with the SS/SHSO to assure that the work is completed in a manner consistent with the SSHSP. The PM is responsible for field implementation of the SSHSP. The PM will be the main contact for any on-site emergencies pertaining to the Operational Range Clearance project. The PM will ensure off-site police and fire emergency agencies have been contacted prior to the start of work. The PM and SS/SHSO are authorized to administer this SSHSP. The PM and the SS/SHSO are authorized to stop work when an imminent health or safety risk exists. The SS/SHSO is responsible for reviewing the SSHSP and ensuring that the SSHSP is complete and accurate. Each employee is responsible for ensuring that they follow SSHSP requirements.

#### **3.2 Key Staff Personnel**

The following individuals share responsibility for health and safety at the site:

Project Principal: Kate Hendrickson Borg  
843.388.1851 (office)  
843.847.7377 (cell)

Project Manager: James Weeg  
843.388.1851 (office)  
843.709.5950 (cell)

Health and Safety Manager: Chris Brown  
843.388.1851 (office)  
843.452.7242 (cell)

### **3.3 Qualifications**

#### **3.3.1 Principal**

Ms. Kate Hendrickson Borg will serve as the Project Principal for this project. Ms. Borg has 16 years of experience in the environmental consulting field and is a licensed CHMM in South Carolina. Ms. Borg has completed 40 hours of initial training in hazardous waste operations (HASWOPER) as required by 29 CFR 1910.120(e), and is up to date on her annual 8-hour HAZWOPER refresher training.

#### **3.3.2 Project Manager**

Mr. James Weeg will serve as the Project Manager, as well as the Site Supervisor/Site Health and Safety Officer for this project. Mr. Weeg has 6 years of experience in the environmental consulting field and is a licensed Professional Geologist in South Carolina. Mr. Weeg has completed 40 hours of initial training in hazardous waste operations (HAZWOPER) as required by 29 CFR 1910.120(e), and is up to date on his annual 8-hour HAZWOPER refresher training.

#### **3.3.3 Health and Safety Manager**

Mr. Chris Brown will serve as the Health and Safety Manager for this project. Mr. Brown has 4 years of experience in the environmental consulting field with requirements for site health and safety. Mr. Brown has completed 40 hours of initial training in hazardous waste operations (HAZWOPER) as required by 29 CFR 1910.120(e), and is up to date on his annual 8-hour HAZWOPER refresher training.

## 4.0 JOB SAFETY ANALYSIS

This section outlines the potential chemical and physical hazards, which workers may be exposed to during the emergency response activities. Table 4.0 lists the site contaminants to which personnel may be exposed. Material Safety Data Sheets (MSDSs) for both the site contaminants and chemicals which may be brought to the site, for which an MSDS is necessary, are included in Appendix A.

### 4.1 Chemical Hazards

The following summarizes the chemicals of concern.

Table 4.0 Chemical Hazards

Chemical	Exposure Route(s)	TLV	Health Hazards/ Physical Hazards
Benzo (a) anthracene	Skin/eye contact, inhalation, ingestion	NA	- Toxic - Probable human carcinogen - Irritant
Benzo (b) fluoroanthene	Skin/eye contact, inhalation, ingestion	NA	- Anticipated human carcinogen
Benzo (k) fluoroanthene	Skin/eye contact, inhalation, ingestion	NA	- Toxic - Probable human carcinogen
Chrysene	Skin/eye contact, inhalation, ingestion	NA	- Toxic - Probable human carcinogen
Dibenz (a,h) anthracene	Skin/eye contact, inhalation, ingestion	NA	- Eye, skin, respiratory irritation
Ethyl-benzene	Skin/eye contact, inhalation, ingestion	100 STEL: 125 ppm; 435 STEL: 545 ppm	- Conjunctivitis, eye irritation, - headache, impaired balance - liver & kidney damage
Ethylene Di-Bromide	Skin/eye contact, inhalation, ingestion	NA	- Toxic - Probable human carcinogen - Severe skin irritant

Chemical	Exposure Route(s)	TLV	Health Hazards/ Physical Hazards
			- Sensitization
Naphthalene	Skin/eye contact, inhalation, ingestion	10 STEL: 15 ppm	- Toxic to blood, kidneys, CNS
Toluene	Skin/eye contact, inhalation, ingestion	50 ppm	- Eye & respiratory tract irritation - CNS depression - If swallowed, may cause chemical pneumonitis
Xylenes	Skin/eye contact, inhalation, ingestion	100 STEL: 150 ppm	- Nausea, vomiting, shivering - CNS depression - Irritation of skin/respiratory tract
Benzene	Skin/eye contact, inhalation, ingestion	0.5 ppm as TWA; 2.5 as STEL	- Irritation of eyes, nose, throat, respiratory system - Chemical pneumonitis - CNS depression

The following general symptoms may indicate exposure to a hazardous chemical. Personnel will be removed from the work site and provided immediate medical attention if the following symptoms occur:

- ◆ Dizziness or stupor
- ◆ Nausea, headaches, or cramps
- ◆ Irritation of the eyes, nose, skin, or throat
- ◆ Chest pains and coughing
- ◆ Rashes or burns

#### 4.2 Ordnance Explosives (OE Standards of Practice, SOP HSE-91)

Not applicable.

#### 4.3 Excavation

Not applicable.

## **4.4 Hazard Communication**

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926.59 to ADVENT personnel and ADVENT subcontractors. Hazard communication will include:

### **4.4.1 Container Labeling**

ADVENT personnel will ensure that drums and containers used for purge water are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. Incoming and outgoing labels shall be checked for identity, hazard warning, and name, address, and phone number of responsible party.

### **4.4.2 Material Safety Data Sheets (MSDSs)**

There will be an MSDS located on site for each hazardous chemical known to be used on site. Hazardous chemical MSDSs will be located in Appendix A of the SSHSP. The site safety plan can be found at the ADVENT Charleston office and with the Site Supervisor.

### **4.4.3 Employee Information and Training**

Training employees on chemical hazards is accomplished through an ongoing corporate training program. Additionally, chemical hazards are communicated to employees through daily safety meetings held at ADVENT field projects and by an initial site orientation program. At a minimum, ADVENT will be instructed on the following:

- ◆ An in-depth review of the contaminants of concern identified above
- ◆ OSHA regulated chemicals and their hazards in the work area
- ◆ How to prevent exposure to these hazardous chemicals
- ◆ What the company has done to prevent workers' exposure to these chemicals
- ◆ Procedures to follow if they are exposed to these chemicals.
- ◆ How to read and interpret labels and MSDSs for hazardous substances found on ADVENT sites
- ◆ Emergency spill procedures
- ◆ Proper storage and labeling

Before a new hazardous chemical is pertinent on site, ADVENT employees will be given information. Such information will also be shared with the subcontractor's representative. The PM will be responsible for seeing that the MSDS on the new chemical is available for review by on site personnel. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings will be held and the hazardous materials used on site will be discussed. Attendance is mandatory for all on site employees.

## 4.5 Physical Hazards

To reduce the potential for physical hazards, ADVENT has developed standard safety protocols that will be followed at all times. Failure to follow safety protocols will result in removal of an employee from the site and appropriate disciplinary actions. In general, the physical hazards on this project of which people should be continually aware include:

- ◆ Sharp edges of metal/glass.
- ◆ Wild animals.
- ◆ Poisonous plants.
- ◆ Insects.
- ◆ Noise.
- ◆ Chemical exposure.
- ◆ Heat Stress and severe weather.
- ◆ Lifting heavy objects.
- ◆ Slips, trips, and falls.
- ◆ Vehicular traffic.

The PM and SS/SHSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures. The crew leaders and SS/SHSO will inspect the work areas. Hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Activity Hazard Analyses have been developed for each principal activity and identify major hazards to which employees may be exposed. Hard hats, safety glasses, and steel-toe safety boots are required in all areas of the site. Site-specific hazards and necessary precautions will be discussed at the daily safety meetings.

### 4.5.1 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dBA (A Weighted Scale), as well as personnel working around heavy equipment. The SHSO will determine the need and appropriate testing procedures, (i.e., sound level meter and/or dosimeter) for noise measurement.

Noise monitoring should be conducted during the beginning of each activity, as well as, any time modifications lead to increased noise levels e.g., adding additional equipment. If needed a sound level meter will be used to measure noise levels at selected locations in the work area and on the site perimeter when treatment equipment is operating normally. When used, noise monitoring equipment must be calibrated before and after each shift.

If continuous noise levels are found to exceed 85 dBA at any location within the work area, warning signs will be posted. Workers and visitors will be notified that hearing protection is required. Appropriate hearing protection (e.g., ear plugs) will be worn whenever personnel or visitors are working in that location. A supply of ear plugs will be maintained on site.

Action levels in the following table will trigger the use of appropriate hearing protection (plugs or muffs). Hearing protection must be able to attenuate noise below 85 dBA (8 hour TWA). Each hearing protection or device has a Noise Reduction Rating (NRR) assigned by the USEPA. The calculation for a hearing protection device's effectiveness is: Noise reading dBA - (NRR - 7dB) < 90 dBA. The minimum NNR rating for hearing protection on-site is 24 dBA. When sound-pressure levels exceed 103 dBA steady-state, personal ear protection equivalent to the combination of ear plugs and earmuffs shall be required. It should be noted that all equipment use will be intermittent and of short duration. At no time should the TWA of noise readings approach 109 dBA.

Table 4.1 Sound Level Guidance

Instrument	Measurement	Action
Type I or Type II Sound Level Meter or dosimeter	>80 dBA → 85 dBA	Hearing protection recommended. Limit work duration to 8-hour shifts.
	>85 dBA → 90 dBA	Hearing protection required. Limit work duration to 8-hour shifts.
	>90 dBA → 109 dBA	Hearing protection required. Investigate use of engineering controls. Limit work duration to 8 hour shifts.
	>109 dBA	Stop work. Consult Health and Safety Manager

#### 4.5.2 Vehicle Safety

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. Fifty percent or more of vehicle safety incidents occur while backing up.

ADVENT requires employees to use seat belts at all times when traveling in ADVENT owned or leased/rented vehicles. In addition, ADVENT employees are expected to incorporate safe actions and preparations to avoid vehicle accidents and personal injury during work and off-hours. Breaks should be planned into lengthy job mobilizations and demobilization's, including rotation of drivers at regular intervals. If parking areas are busy or crowded and more than one worker is traveling in the same vehicle, one worker should remain outside the vehicle as it leaves the parking space to assist the driver with traffic observation. Vehicles traveling before dawn and at dusk in rural or wooded areas should be prepared to brake for wildlife, e.g., deer crossing roadways.

ADVENT employees arriving at work areas should park vehicles away from delivery, heavy equipment and vehicle loading/unloading locations to prevent parked vehicles from damage by various deliveries. Heavy equipment operators should inspect areas and request vehicles to be moved or spotters used if necessary, to maneuver equipment in tight areas. Employees who observe near misses or potential risks to parked or moving vehicles must report these to the SS / SHSO immediately.

ADVENT employees are expected to check/test the safety systems on the vehicle on a daily basis. These systems include: brakes, mirrors, seat belts, tires, leakage from the undercarriage, lights and turn signals. Vehicles with safety deficiencies must be reported immediately and not driven until properly repaired, unless the vehicle is being driven to be repaired. Vehicles running errands from different project sites should have telephone numbers of the job site in the vehicle in case calls for assistance are required.

Because of the different ways alcohol can affect behavior, even in very small amounts, the best and safest course is not to drink before driving. Personnel involved in motor vehicle incidents are subject to drug and alcohol testing.

Weather conditions can have a profound effect on driving. On slippery roads, drive more slowly. Stop and turn with care. Keep several car lengths from other vehicles. At speeds in excess of 35 mph, the chances of hydroplaning increase with speed. In general, keep back one car length for every 10 mph to prevent striking the car ahead.

Vehicles will be operated in accordance with the requirements listed below:

- ◆ Seatbelt use is mandatory for all passengers;
- ◆ Personnel may not ride in the back of cargo vehicles;
- ◆ The driver must make a 360 degree walk around the assigned vehicle prior to vehicle movement;
- ◆ Vehicle speed is limited to the posted speed limits for developed roadways, 25 mph maximum on dirt roads and off-road (based on conditions);
- ◆ Vehicles are to be driven in four wheel low and low gear when on dirt roads or off road driving where steep grades dictate;
- ◆ All operators must possess a valid drivers license;
- ◆ Fuel or gasoline are not transported inside the passenger compartment;
- ◆ No vehicle is left running when unattended, exclude use to run equipment like pumps, samplers, etc.; and
- ◆ Parking brakes are used when vehicles are parked.

In the event of a vehicle incident, notify the PM immediately and complete required reports.

### **4.5.3 Lifting of Heavy Objects**

In the event that heavy lifting is required on site, know and use the proper lifting technique. This is one of the most important things you can do to protect your back. To see if you can carry an object comfortably, tip it on its side. If it's too heavy or awkward to carry, get help or make two trips. Make sure your footing is solid. Maintain good balance by placing one foot to the rear of the object and the other slightly ahead of the first and to the side of the object. Next, center your body over your feet with your feet far enough apart for balance, keep your back straight, with no curving or slouching, squat down, bending at the hips and knees, and grasp the object firmly with one foot slightly ahead of the other and pull it close to you. As you grip the load, arch your back inward by pulling your shoulders back and stick your chest out. Also, lift your chin up. Keep the load close to your body. The closer it is, the less pressure it puts on your back. Lift with your legs, not your back. Carry the load with your elbows against your side. To turn, move your feet, do not twist your back. When you set the load down, squat, bending at the hips and knees, keeping your lower back arched in.

#### **4.5.4 Confined Space**

Confined space entry is not anticipated for this project. No entry is authorized for this work.

#### **4.6 Environmental Hazards**

Environmental factors such as weather, wild animals, insects, and irritant plants may pose a hazard when performing outdoor tasks. The SS/SHSO and PM will take necessary actions to alleviate these hazards should they arise.

##### **4.6.1 Heat Stress**

The combination of warm ambient temperature and protective clothing increases the potential for heat stress. Heat stress disorders include:

- ◆ Heat rash
- ◆ Heat cramps
- ◆ Heat exhaustion
- ◆ Heat stroke

This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages; e.g., Gatorade. Heat stress can be prevented by assuring an adequate work/rest schedule. Guidelines are presented below.

In addition, workers are encouraged to take rests and report symptoms whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased based on worker recommendation to the SHSO / SS. Heat stress can be prevented by assuring an adequate work/rest schedule and adequate fluid consumption. A guide for work/rest schedules for various protection levels are given below in Table 4.2. The number of hours before a work/rest period is based on experience with similar work. The time periods should be considered maximum. It must also be remembered that individual physical variability's and differences in physical work activities may require revisions to site plans. This table should be used as a guide. Professional judgment of the SS / SHSO is necessary to assure a fully protective plan to prevent heat stress disorders.

Table 4.2 Guidelines For Work-Rest Periods Protection Level Number Of Hours Before Rest Period

Temperature	Level D	Level C	Level B	Level A
90+ F*	2.0	1.5	1.0	0.5
87.5 F	2.5	2.0	1.5	1.0
82.5 F	3.0	2.5	2.0	1.5
77.5 F	3.5	3.0	2.5	1.5
72.5	4.0	3.5	2.5	1.5

\*Work above 100° F will be reviewed with the PM to determine specific requirements.

Alternately the work/rest schedule can be calculated based on heat stress monitoring results. Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate exceeds 75 percent of their calculated maximum heart rate (MHR = 200 – age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75 percent of their calculated maximum heart rate.

Body temperature, measured orally or through the ear canal, may also be monitored to assess heat stress. Workers should not be permitted to continue work when their body temperature exceeds 100.4°F (degrees Fahrenheit) (38° Celsius [°C]). Monitoring should be conducted at the beginning of each break period as noted above.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70°F when wearing chemical protective clothing (Level C, B, A), or 80°F for site activities performed with no chemical protective clothing (Level D). Monitoring will include pulse rate, weight loss, oral/ or ear canal temperature, signs and symptoms of heat stress and fluid intake.

#### 4.6.2 Lightning

The procedures provided below will be used to protect site personnel from lightning related injuries.

##### 4.6.2.1 Training

A tailgate safety meeting will be conducted to increase awareness to the hazards and prevention of lightning related incidents.

##### 4.6.2.2 Detection of Lightning

The SS/SHSO will be proactive in monitoring conditions that may produce thunderstorms and lightning. A daily and weekly weather forecast will be tracked and communicated to site personnel. When signs of impending storms, i.e., increasing wind, darkening skies, or lightening appear, local weather monitoring will be increased. The National Weather

Service ([www.nws.noaa.gov/](http://www.nws.noaa.gov/)) should be consulted frequently. Personnel will be notified when thunderstorms may impact the site.

The "flash/bang" (f/b) technique of measuring the distance to lightning will be reviewed with all personnel. The f/b technique is defined as: for each five seconds from the time of observing the lightning flash to hearing the associated thunder, the lightning is one mile away.

#### **4.6.2.3 Suspension/Resumption of Activities**

All outside activities will be suspended when a lightning flash is immediately in the area or a f/b of 20 seconds (4 miles away) is noted. Personnel may continue indoor work activities. Outdoor activities will resume when 30 minutes has passed since the last observable f/b is 20 seconds or greater.

#### **4.6.2.4 Lightning Protection**

When notification is given, all outside work activities will stop and personnel will gather in the support zone for a head count and further instructions. Indoor work will continue, except for the use of electrical equipment, telephones and computers. When a safe location is not present and personnel are caught by a sudden lightning event, employees should seek the lowest possible area, away from large objects which might attract lightning or fall over, e.g., trees, utility poles. The employee should assume a crouching position with their head lowered and hands over their ears. **AVOID: WATER, HIGH GROUNDS, HEAVY EQUIPMENT AND TALL, ISOLATED OBJECTS.**

#### **4.6.2.5 First Aid**

An employee that is struck by lightning needs immediate assistance (call 911). The body will not carry an electrical charge, but receives a severe electrical shock and may be burned. Personnel certified in first aid/CPR should inspect for shock and burns around fingers, toes, buckles and jewelry. Stay with the injured employee until medical help arrives.

### **4.7 Biological Hazards**

#### **4.7.1 Poison Ivy (RHUS RADICANS)**

Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a Tyvek<sup>®</sup> coverall, to avoid skin contact. The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- ◆ General symptoms of headache and fever
- ◆ Itching
- ◆ Redness
- ◆ Rash.

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

A barrier cream (e.g., Stokogard Outdoor Cream, Stockhausen, Inc., 1-800-334-0242) should be applied to the exposed skin before entering and working in areas with possible poisonous plants.

#### 4.7.1.1 Distinguishing Features of Poison Ivy Group Plants.

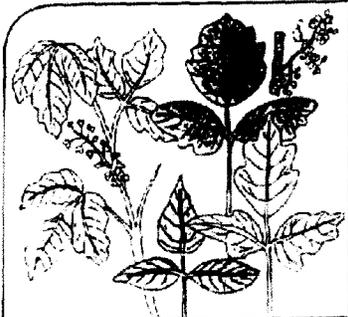
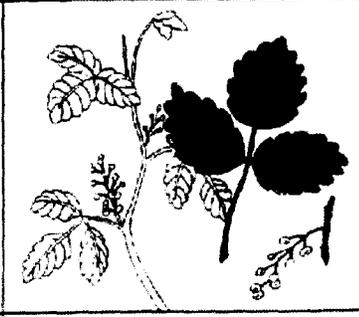
The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

#### 4.7.1.2 First Aid

- ◆ Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol. 1 percent hydrocortisone cream (over-the-counter) will aid in healing and reducing itch.
- ◆ Apply calamine or other soothing lotion if rash is mild.
- ◆ Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

#### 4.7.1.3 Contaminated Clothing

The irritating substances emitted by poison ivy group plants will remain on clothing for prolonged periods of time, up to weeks or months, if not washed thoroughly. It may be necessary to wash contaminated clothing separately and more than once before reusing.

	<p><b>COMMON POISON IVY (RHUS RADICANS)</b></p> <ul style="list-style-type: none"><li>• Grows as a small plant, a vine, and a shrub.</li><li>• Grows everywhere in the United States except California and parts of adjacent states. Eastern oak leaf poison ivy is one of its varieties.</li><li>• Leaves always consist of three glossy leaflets.</li><li>• Also known as three-leaf ivy, poison creeper, climbing sumac, poison oak, markweed, picry, and mercury.</li></ul>
<p><b>WESTERN POISON OAK (RHUS DIVERSILOBA)</b></p> <ul style="list-style-type: none"><li>• Grows in shrub and sometimes vine form.</li><li>• Grows in California and parts of adjacent states.</li><li>• Sometimes called poison ivy, or yewea.</li><li>• Leaves always consist of three leaflets.</li></ul>	
	<p><b>POISON SUMAC (RHUS VERNIX)</b></p> <ul style="list-style-type: none"><li>• Grows as a woody shrub or small tree from 5 to 25 feet tall.</li><li>• Grows in most of eastern third of United States.</li><li>• Also known as swamp sumac, poison elder, poison ash, poison dogwood, and thunderwood.</li></ul>

## 4.7.2 West Nile Virus and West Nile Encephalitis

West Nile Virus/West Nile Encephalitis is rapidly becoming a health concern in the United States. West Nile Virus was first identified in the U.S. in the New York area in 1999 and is closely related to the St. Louis Encephalitis Virus, which is routinely found in the United States.

"Encephalitis" means an inflammation of the brain and it can be caused by viral and bacterial infections. West Nile Encephalitis can be a serious or even fatal illness although this is rare in humans. This illness develops in approximately one of every 150 infections and is generally confined to older and physically compromised individuals.

West Nile Encephalitis is a viral infection of the brain transmitted through the bite of a mosquito, which has previously fed on birds and/or horses that were infected with West Nile Virus. Dead birds in an area may mean that West Nile Virus is circulating between the birds and the mosquitoes in that area. West Nile Virus is not transmitted from one person to another. Human illness from West Nile Virus is rare, even in areas where the virus has been reported.

Symptoms of Exposure - Most people who become infected with West Nile Virus will have either no symptoms or only mild ones. Symptoms of West Nile Encephalitis include high fever, headache, confusion, muscle aches and weakness, seizures, or paralysis. At its most serious, the infection can result in coma, permanent neurological damage, and death. Symptoms usually occur five to 15 days following the bite of an infected mosquito. Because West Nile Encephalitis is a viral infection, antibiotics are not effective and there is no specific treatment available other than general support therapy.

### 4.7.2.1 Protective Measures at Projects

There is no vaccine to protect humans against West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- ◆ Review the hazards of West Nile Virus periodically in morning safety meetings.
- ◆ Increase protective measures when working at dawn, dusk, and in the early evening.
- ◆ Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the Level D clothing worn, e.g., heavy long sleeve work shirts and heavy jeans may be ideal. Also, the risk of mosquito bites is reduced for those activities that require the use of disposable coveralls.
- ◆ For activities where only Level D Personal Protective Equipment (PPE) is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- ◆ Use an insect repellent containing approximately 30% DEET (N, N-diethyl-meta-toluamide). DEET in concentrations greater than 35% provides no additional protection but repels insects longer. However, at some point there is no direct

correlation between concentration and repellency. For example, 50% DEET provides about four hours of protection against mosquitoes, but increasing the concentration to 100% provides only one additional hour of protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent re-application is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.

- ◆ After returning from outdoor field activities, wash treated skin with soap and water.
- ◆ Personnel should report flu-like symptoms to the SHSO.

DEET is safe for pregnant and lactating women and is generally safe for children. You should avoid applying it to open wounds and irritated skin as it may further irritate the skin or cause discomfort. When used according to label directions, millions of people have used DEET repellents to provide protection against mosquitoes and ticks with minimal risk. Nevertheless, no repellent is 100 percent safe and repellents must be used carefully. Use of DEET concentrations above 50 percent have been associated with increased skin irritation and similar reactions. In very rare circumstances, slurred speech, confusion, and seizures have been associated with the use of DEET, particularly in children. However, some of these persons had a history of long-term, excessive or improper use of DEET repellents. The risk of experiencing any adverse health effects is reduced when products containing DEET are used according to label instructions and concentrated DEET products are avoided.

Sweating, perspiration and getting wet may wash away the repellent and may require that DEET containing repellent be re-applied.

To remove the breeding places on a project, the following precautions will be followed as practical:

- ◆ Cut tall grass and weeds
- ◆ Drain accumulated water in such items as drums, buckets, pools and plastic containers
- ◆ Repair holes in door and window screens
- ◆ Eliminate stagnate water puddles as practical
- ◆ Limit outdoor activities at dawn, dusk and early evening, when mosquitoes are most active, as practical

#### **4.8 Activity Hazard Analyses**

The Activity Hazard Analyses (AHAs) for primary site tasks contain detailed information on physical and chemical hazards, and provide control measures for these hazards. The AHA's will be field checked by the PM and the SS/SHSO on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew.

<b>ACTIVITY HAZARD ANALYSIS</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
	Slips, Trips, Falls	<ul style="list-style-type: none"> <li>• Clear walkways, work areas of equipment, tools, vegetation, and debris</li> <li>• Clean mud and grease from your boots before mounting equipment. Watch for slippery/unstable ground when dismounting equipment</li> <li>• Exit equipment slowly and maintain three point contact</li> </ul>		
	Handling Heavy Objects	<ul style="list-style-type: none"> <li>• Observe proper lifting techniques</li> <li>• Obey sensible lifting limits (60 lb. maximum per person manual lifting)</li> </ul>		
	Fire/ Explosion	<ul style="list-style-type: none"> <li>• Eliminate sources of ignition from the work area</li> <li>• Prohibit smoking</li> <li>• Provide a 20 pound ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor locations</li> </ul>	Portable fire extinguishers	

<b>ACTIVITY HAZARD ANALYSIS</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
	Sharp Objects: Glass, metal, plastic, etc.	<ul style="list-style-type: none"> <li>• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects</li> <li>• Maintain all hand and power tools in a safe condition</li> <li>• Keep guards in place during use</li> <li>• Close doors, windows on heavy equipment to prevent injuries from tree branches and other vegetation</li> </ul>	Leather gloves	
	Contact Dermatitis	<ul style="list-style-type: none"> <li>• Wear PPE to avoid skin contact with contaminated soil, plants, or other skin irritants</li> <li>• Identify and review poisonous plants with workers</li> <li>• Apply protective cream/lotion to exposed skin to prevent poison ivy or similar reactions</li> </ul>	Tyvek coveralls, (duct tape bottom of coveralls to boots)	
	High Noise Levels	<ul style="list-style-type: none"> <li>• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)</li> </ul>	Hearing protection	

<b>ACTIVITY HAZARD ANALYSIS</b>				
<b>Task Breakdown</b>	<b>Potential Hazards</b>	<b>Critical Safety Practices</b>	<b>Personal Protective Clothing and Equipment</b>	<b>Monitoring Devices</b>
	High Ambient Temperature	<ul style="list-style-type: none"> <li>• Monitor for heat stress</li> <li>• Provide fluids to prevent worker dehydration</li> </ul>		Meteorological Equipment
	Inhalation and Contact with Hazardous Substance	<ul style="list-style-type: none"> <li>• Review potential hazardous properties of site contaminants with workers before operations begin</li> </ul>	nitrile gloves	
	Adverse weather conditions: -lightening -high winds -driving rain	<ul style="list-style-type: none"> <li>• Monitor weather forecast</li> <li>• Shut down operations should severe weather conditions exist</li> <li>• See the Hurricane Preparedness Plan in Appendix G of the SSHSP.</li> </ul>		
<b>EQUIPMENT REQUIRED</b>		<b>INSPECTION REQUIREMENTS</b>	<b>TRAINING REQUIREMENTS</b>	
		•		

## 5.0 WORK SUPPORT AREAS

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

- ◆ Exclusion Zone (EZ)
- ◆ Contamination Reduction Zone (CRZ)
- ◆ Support Zone (SZ)

A log of all personnel visiting, entering or working on the site shall be maintained by the SS/SHSO. No visitor will be allowed in the EZ without showing proof of training and medical certification, per 29 CFR 1910.120(e), (f). Visitors will attend a site orientation given by the SS/SHSO and sign the SSHSP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- ◆ Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the EZ/CRZs.
- ◆ Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco, and smoking.
- ◆ A buddy system will be used. Standard hand signals will be established to maintain communication prior to entering any work support area.
- ◆ During site operations, each worker will consider himself as a safety backup to his partner. Off site personnel provide emergency assistance.
- ◆ Visual contact will be maintained between buddies on site when performing hazardous duties.
- ◆ No personnel will be admitted to the site without proper safety equipment, training, and medical surveillance certification.
- ◆ All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the PM, will be immediately dismissed from the site.
- ◆ Proper decontamination procedures must be followed before leaving the site.
- ◆ All employees and visitors must sign in and out of the site.

## 6.0 PROTECTION EQUIPMENT

This section specifies the levels of PPE which are or may be required for each principal activity performed at this site. All ADVENT site personnel must be trained in the use of all PPE utilized. The ADVENT PPE program will be applied to project activities conducted by ADVENT personnel.

### 6.1 Anticipated Protection Levels

The following protection levels have been established for the site work activities. Results of site air monitoring and visual inspection of the work activities may indicate the need for changes in PPE level(s).

Table 6.0 Protection Levels

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Various	Level D	Mod Level D	Level D	None	Safety glasses with side shields, work boots, and hearing protection >85 dBA.

Please note: ADVENT site monitoring personnel. Subcontractors are responsible for SSHSP for their activities.

### 6.2 Protection Level Descriptions

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted above.

#### 6.2.1 Level D

Level D may consist of the following:

- ◆ Safety glasses with side shields
- ◆ Work boots
- ◆ Work clothing as prescribed by weather
- ◆ Nitrile gloves
- ◆ Reflective vests for ground personnel working around heavy equipment or roadways
- ◆ Hearing protection in areas >85 dBA

#### 6.2.2 Modified Level D

Modified Level D may consist of the following:

- ◆ Safety glasses with side shields
- ◆ Hard hat

- ◆ Work boots
- ◆ Tyvek<sup>®</sup> coverall /Poly-coated Tyvek<sup>®</sup> coverall (equipment decontamination)
- ◆ Boot covers
- ◆ Inner nitrile sample gloves
- ◆ Outer nitrile gloves
- ◆ Face shield and goggles (equipment decontamination)
- ◆ Reflective vests for ground personnel working around heavy equipment or roadways
- ◆ Hearing protection in areas >85 db

## **7.0 DECONTAMINATION PROCEDURE**

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

### **7.1 Personnel Decontamination**

Decontamination procedures are intended to reduce the potential that material to which workers may have come into contact in the EZ do not result in personal exposure and is not spread to clean areas of the site. This sequence describes the general decontamination procedure. The specific stages will vary depending on the site, the task, the protection level, etc.

#### **7.1.1 Level D Decontamination**

1. Go to end of EZ
2. Remove inner sample gloves and discard
3. Wash face and hands

#### **7.1.2 Modified Level D Decontamination**

1. Go to end of EZ
2. Remove outer gloves and discard
3. Remove outer suit and discard
4. Remove inner sample gloves and discard.
5. Wash face and hands

#### **7.1.3 Suspected Contamination**

On sites required to have an anticipated decontamination area, any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first aid station. Medical attention will be provided based on the degree of injury.

#### **7.1.4 Personal Hygiene**

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

### **7.2 Equipment Decontamination**

Sample equipment will be properly decontaminated at the completion of work. Single use sample equipment will be properly disposed of at the completion of work.

### **7.3 Disposal**

Wastes will be disposed in accordance with local, state, and federal regulations.

## **8.0 AIR MONITORING**

If applicable, air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. Principal contaminants of concern are listed in Section 4.0 of this plan. Descriptions of air monitoring strategies, procedures and equipment are provided below. Modification of this plan, including additional monitoring, may be considered as judged necessary by the ADVENT HSM, in conjunction with the PM and SHSO.

### **8.1 Work Area Air Monitoring**

Work area air monitoring at the CTF will not include direct reading methods. Air monitoring will not be used prior to and during this project.

## 9.0 EMERGENCY RESPONSE

### 9.1 Pre-Emergency Planning

Prior to engaging in waste stream determination activities at the site, ADVENT will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition, site personnel will receive training during the site orientation concerning proper emergency response procedures. The following situations would warrant implementation of the Emergency Response and Contingency Plan (ERCP):

Fire/Explosion	<ul style="list-style-type: none"> <li>◆ The potential for human injury exists.</li> <li>◆ Toxic fumes or vapors are released.</li> <li>◆ The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions.</li> <li>◆ The use of water and/or chemical fire suppressants could result in contaminated run-off.</li> <li>◆ An imminent danger of explosion exists</li> </ul>
Spill or Release of Hazardous Materials	<ul style="list-style-type: none"> <li>◆ The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard.</li> <li>◆ The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health.</li> </ul>
Spill or Release	<ul style="list-style-type: none"> <li>◆ The spill can be contained on site, but the potential exists for soil and groundwater contamination.</li> <li>◆ The spill cannot be contained on site, resulting in additional off-site soil contamination and/or ground water or surface water pollution.</li> <li>◆ The spill quantity is greater than the reportable quantity limit for the material.</li> </ul>
Natural Disaster	<ul style="list-style-type: none"> <li>◆ A rainstorm exceeds the flash flood level.</li> <li>◆ The facility is in a projected tornado path or a tornado has damaged facility property.</li> <li>◆ Severe wind gusts are forecasted or have occurred and have caused damage to the facility.</li> </ul>
Medical Emergency	<ul style="list-style-type: none"> <li>◆ Overexposure to hazardous materials.</li> <li>◆ Trauma injuries (broken bones, severe lacerations/bleeding, burns).</li> <li>◆ Eye/skin contact with hazardous materials.</li> <li>◆ Loss of consciousness.</li> <li>◆ Heat stress (Heat stroke).</li> <li>◆ Heart attack.</li> <li>◆ Respiratory failure.</li> <li>◆ Allergic reaction.</li> </ul>

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- ◆ Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.
- ◆ On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site ADVENT personnel required to respond.
- ◆ It will be the responsibility of the Emergency Coordinator to brief the on-site response team on anticipated hazards at the site. The Emergency Coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.
- ◆ Emergency response activities will be coordinated with the Local Emergency Management Agency (EMA) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be verbal communications and air horns. Any telephone may be used to contact emergency personnel.

Primary communication with local responders in the event of an emergency will be accomplished using a cellular telephone if commercial telephone lines are not available.

## 9.2 Emergency Recognition and Prevention

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the PM and the SS/SHSO, through daily site inspections and employee feedback (Daily safety meetings, and job safety analyses) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	<ul style="list-style-type: none"><li>• Materials at the site</li><li>• Materials brought to the site</li></ul>
Physical Hazards	<ul style="list-style-type: none"><li>• Fire/explosion</li><li>• Slip/trip/fall</li><li>• Electrocution</li><li>• IDLH atmospheres</li><li>• Excessive noise</li></ul>
Mechanical Hazards	<ul style="list-style-type: none"><li>• Heavy equipment</li><li>• Stored energy system</li><li>• Pinch points</li><li>• Electrical equipment</li><li>• Vehicle traffic</li></ul>

Environmental Hazards	<ul style="list-style-type: none"> <li>• Electrical Storms</li> <li>• High winds</li> <li>• Heavy Rain/Snow</li> <li>• Temperature Extremes (Heat Stress)</li> <li>• Poisonous Plants/Animals</li> </ul>
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Once a hazard has been recognized, the PM and the SS/SHSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- ◆ Daily safety meetings
- ◆ Task specific training prior to commencement of activity
- ◆ PPE selection/use
- ◆ Written and approved permits for hot work and confined space
- ◆ Trenching/shoring procedures
- ◆ Air monitoring
- ◆ Following all ADVENT standard operating procedures

**Table 9.1 Emergency Telephone Numbers**

<b><u>Local Agencies:</u></b>		
Ambulance		911
Fire		911
Police		911
<b><u>Hospital: MUSC</u></b> 171 Ashley Ave. Charleston, SC 29425		843.792.2300
Directions: See Appendix C for route map		
<b><u>Regional Poison Control Center</u></b>		800.282.5846
<b><u>Federal Agencies:</u></b>		
Center for Disease Control		404.639.3311
Chemtrec		800.424.9300 (24 hrs.)
<b><u>Other Personnel:</u></b>		
ADVENT Project Principal:	Kate Hendrickson Borg	(o) 843.388.1851
ADVENT Project Manager:	Jim Weeg	(cell) 843.709.5950
ADVENT Health and Safety Manager:	Chris Brown	(cell) 843.452.7242
BRAC SE:	Kathryn A. Stewart	(o) 843.743.2134

### **9.3 Personnel Roles, Lines of Authority, Communications**

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses. The primary Emergency Coordinator for this site is the SS/SHSO. In the event an emergency occurs and the Emergency Coordinator is not on site, the PM or the highest-ranking employee on site will serve as the Emergency Coordinator until they arrive. The Emergency Coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The Emergency Coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the Emergency Coordinator or his designee will evaluate the situation to determine the appropriate action.

#### **9.3.1 Responsibilities and Duties**

This section describes the responsibilities and duties assigned to the Emergency Coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. ADVENT will follow procedures as directed by the Fire Department, LEPC, State and Federal Agencies as required. ADVENT will defer to the local Fire Department Chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

#### **9.3.2 On-Site Emergency Coordinator Duties**

The on-site Emergency Coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the Emergency Coordinator. Specific duties are as follows:

- ◆ Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.
- ◆ Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where appropriate.
- ◆ Notify local Emergency Response Teams if their help is necessary to control the incident. Table 9.1 provides telephone numbers for emergency assistance.
- ◆ Direct on-site personnel to control the incident, if necessary, until outside help arrives.
- ◆ Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate. The Emergency

Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.

- ◆ If fire or explosion is involved, notify Fire Department.
- ◆ Notify ADVENT PM.
- ◆ Notify BRAC contact
- ◆ Have protected personnel, in appropriate PPE, on standby for rescue, if appropriate.

If the incident may threaten human health or the environment outside of the site, the Emergency Coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the National Response Center.

The following information should be provided to the National Response Center:

- ◆ Name and telephone number
- ◆ Name and address of facility
- ◆ Time and type of incident
- ◆ Name and quantity of materials involved, if known
- ◆ Extent of injuries
- ◆ Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800.424.8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- ◆ Waste is collected and contained.
- ◆ Containers of waste are removed or isolated from the immediate site of the emergency.
- ◆ Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- ◆ Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- ◆ Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

#### **9.4 Safe Distances and Places of Refuge**

No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies that could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or

leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the Emergency Coordinator or their designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The Emergency Coordinator, or their designee, will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 9.1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- ◆ Chemical release
- ◆ Fire/explosion
- ◆ Power loss
- ◆ Medical emergency
- ◆ Hazardous weather

In general, evacuation will be made to the main site gate, unless the Emergency Coordinator determines otherwise. It is the responsibility of the Emergency Coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the main gate until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the Emergency Coordinator.

## **9.5 Evacuation Routes and Procedures**

Emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the Emergency Coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The Emergency Coordinator is responsible for determining which situations require site evacuation.

### **9.5.1 Evacuation Signals and Routes**

An air horn and verbal communication will be used to notify employees of the necessity to evacuate an area involved in a release/spill of a hazardous material. Only the Emergency

Coordinator will initiate total site evacuation, however, in their absence, a decision to preserve the health and safety of employees will take precedence.

### **9.5.2 Evacuation Procedures**

In the event evacuation is necessary, the following actions will be taken:

- ◆ The emergency signal will be activated.
- ◆ No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.
- ◆ Shut off all machinery if safe to do so.
- ◆ ALL on-site personnel, visitors, and contractors in the support zone will assemble at a designated meeting area for a head count and await further instruction from the Emergency Coordinator.
- ◆ ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.
- ◆ Upon completion of the head count, the crew leader will provide the information to the Emergency Coordinator.
- ◆ Contract personnel and visitors will also be accounted for.
- ◆ The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- ◆ The Emergency Coordinator or designee will make a final tally of persons. No attempt to find persons not accounted for will involve endangering lives of ADVENT or other employees by re entry into emergency areas.

In all questions of accountability, each person will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the PM. The SS/SHSO will aid in accounting for visitors, contractors, and truckers by reference to sign in sheets.

- ◆ Personnel will be assigned by the Emergency Coordinator to be available to direct and brief emergency responders.
- ◆ Re-entry into the site will be made only after the Emergency Coordinator gives clearance. At their direction, a signal or other notification will be given for re-entry into the facility.
- ◆ Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

### **9.6 Emergency Spill Response Procedures and Equipment**

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation.

Emergency contacts found in Table 9.1 provide a quick reference guide to follow in the event of a major spill.

### **9.6.1 Notification Procedures**

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, they will immediately notify the on-site Emergency Coordinator. The on-site Emergency Coordinator will obtain information pertaining to the following:

- ◆ The material spilled or released.
- ◆ Location of the release or spillage of hazardous material.
- ◆ An estimate of quantity released and the rate at which it is being released.
- ◆ The direction in which the spill, vapor or smoke release is heading.
- ◆ Any injuries involved.
- ◆ Fire and/or explosion or possibility of these events.
- ◆ The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site Emergency Coordinator to assess the magnitude and potential seriousness of the spill or release.

## **9.7 Emergency Contingency Plan**

This section of the ERCP details the contingency measures ADVENT will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

## **9.8 Medical Emergency Contingency Measures**

The procedures listed below will be used to respond to medical emergencies. The SS/SHSO will contact the local hospital and inform them of the site hazards and potential emergency situations.

### **9.8.1 Response**

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The PM will be summoned. The PM will immediately contact the on-site Emergency Coordinator to alert them of a medical emergency situation. The PM will apprise them of the following information:

- ◆ Location of the victim at the work site
- ◆ Nature of the emergency
- ◆ Whether the victim is conscious
- ◆ Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the PM. The following actions will then be taken depending on the severity of the incident:

### **9.8.1.1 Life-Threatening Incident**

If an apparent life-threatening condition exists, the PM will inform the Emergency Coordinator and the local Emergency Medical Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have them quickly taken to the victim. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.

### **9.8.1.2 Non Life-Threatening Incident**

If it is determined that no threat to life is present, the SS/SHSO will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

\*NOTE: The area surrounding an accident site must not be disturbed until the scene has been cleared by the SS/SHSO.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- ◆ Wash external clothing and cut it away.
- ◆ If decontamination cannot be performed, observe the following procedures.
- ◆ Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- ◆ Alert emergency and off-site medical personnel to potential contamination. Instruct them about specific decontamination procedures.
- ◆ Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the PM and SS/SHSO. An accident/injury/illness report will be completely and properly filled out and submitted to the PM in accordance with ADVENT's reporting procedures.

A list of emergency telephone numbers is given in Table 9.1.

### 9.8.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- ◆ Fire Department or EMS
- ◆ On-site Emergency Coordinator
- ◆ Workers in the affected areas
- ◆ ADVENT PM

### 9.9 Fire Contingency Measures

ADVENT personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the Emergency Coordinator and vacate the structure or area. The Emergency Coordinator will immediately notify the local Fire Department. The following procedures will be used to prevent the possibility of fires and resulting injuries:

- ◆ Sources of ignition will be kept away from where flammable materials are handled or stored.
- ◆ In some cases, the air will be monitored periodically for explosivity before and during work and where flammable materials are present.
- ◆ "No smoking" signs will be conspicuously posted in areas where flammable materials are present.
- ◆ Fire extinguishers will be placed in all areas where a fire hazard may exist.
- ◆ Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

#### 9.9.1 Response

The following procedures will be used in the event of a fire:

- ◆ Anyone who sees a fire will notify their supervisor who will then contact the Emergency Coordinator. The Emergency Coordinator will activate the emergency air horns and contact the local Fire Department.
- ◆ When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit if applicable.
- ◆ Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- ◆ When a worker has extinguished a small fire, the Emergency Coordinator will be notified.

## **9.10 Hazardous Weather Contingency Measures**

Operations will not be started or continued when the following hazardous weather conditions are present:

- ◆ Lightning
- ◆ Heavy Rains
- ◆ High Winds

### **9.10.1 Response**

- ◆ Excavation/soil stockpiles will be covered with plastic liner.
- ◆ All equipment will be shut down and secured to prevent damage.
- ◆ Personnel will be moved to safe refuge. The Emergency Coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

### **9.10.2 Notification**

The Emergency Coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- ◆ ADVENT employees and subcontractors
- ◆ BRAC contact
- ◆ Local Emergency Management Agency

## **9.11 Spill/Release Contingency Measures**

In the event of release or spill of a hazardous material the following measures will be taken:

### **9.11.1 Response**

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

The Emergency Coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Air monitoring will be implemented by the Emergency Coordinator and SS/SHSO to determine the potential impact on the surrounding community. Notification procedures will be followed to inform on-site personnel and off-site agencies. The Emergency Coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- ◆ Construction of a temporary containment berm utilizing on-site clay absorbent earth
- ◆ Digging a sump, installing a polyethylene liner and
- ◆ Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- ◆ Transferring the material from its original container to another container

The Emergency Coordinator will notify the BRAC contact of the spill and steps taken to institute clean up. Emergency response personnel will clean up all spills following the spill clean-up plan developed by the Project Principal, PM, or HSM. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- ◆ Shovel, rake
- ◆ Polyethylene liner
- ◆ Personal safety equipment
- ◆ Steel drums
- ◆ Miscellaneous hand tools

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will kept at active work locations. The Emergency Coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the BRAC contact. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The Emergency Coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The Emergency Coordinator will review the cause with the BRAC contact and obtain his concurrence with the remedial action plan.

## 10.0 TRAINING REQUIREMENTS

As a requirement for work at this site, in any hazardous waste work area, all field personnel will be required to take an OSHA 40-hour training class. This training must cover the requirements in 29 CFR 1910.120: personal protective equipment, toxicological effects of various chemicals, hazard communication, blood borne pathogens, handling of unknown tanks and drums, confined-space entry procedures, electrical safety, etc. In addition, all personnel must receive annual OSHA 8-hour refresher training. Supervisory personnel shall have received an additional OSHA 8-hour training in handling hazardous waste operations.

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix C.

Site-specific training for activities at the CTF will include potential site contaminants, Hazard Communication as per 29 CFR 1910.1200, site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held by the PM before any site work activities begin.

Outlines of the orientation for ADVENT/ADVENT Subcontract personnel and visitors are presented below:

ADVENT/SUBCONTRACTORS	VISITOR ORIENTATION
<ul style="list-style-type: none"><li>• SSHSP review and sign off</li><li>• Sign in/out procedures</li><li>• Site background</li><li>• Review of site map</li><li>• Chain of command</li><li>• Rules and regulations</li><li>• Hours of work</li><li>• Absences</li><li>• Equipment</li><li>• Emergency Information</li><li>• Emergency signal</li><li>• Gathering point</li><li>• Responsibilities/roles</li><li>• Emergency phone numbers</li><li>• Work Zones</li><li>• Contaminants and Material Safety Data Sheets (MSDS) [Hazard Communication Program]</li><li>• AHAs (Activity Hazard Analyses)</li><li>• Prohibited on-site activities</li><li>• Incident Reporting</li></ul>	<ul style="list-style-type: none"><li>• Sign in/out procedures</li><li>• Review of site map</li><li>• Work zones in progress</li><li>• Hazard Communication</li><li>• Emergency plan/signals</li><li>• Training/medical requirements</li><li>• Zones/areas open to visitors</li></ul>

## **11.0 MEDICAL SURVEILLANCE PROGRAM**

All ADVENT personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. This program was developed in conjunction with a consultant toxicologist and ADVENT's occupational health physician. Other medical consultants are retained when additional expertise is required.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120/1926.65(f).

No specific tests are expected for this project.

## **12.0 BLOOD-BORNE PATHOGEN EXPOSURE CONTROL PLAN**

Blood-borne pathogens are microorganisms (i.e., bacteria, virus) sometimes present in blood and certain body fluids, which are capable of causing human disease or death. These pathogens can also be present on objects and surfaces that have had contact with infected blood or certain body fluids. Blood-borne pathogens are also capable of causing human disease or death to unprotected people who come into contact with infected blood or body fluids. Diseases caused by blood-borne pathogens include, but are not limited to, hepatitis A, hepatitis B, hepatitis C, malaria, acquired immunodeficiency syndrome (AIDS), and sexually transmitted diseases. The most significant of these and of greatest concern are hepatitis B and AIDS.

A hazard exists for blood and other bodily fluids to be infected with dangerous, infectious pathogens. Employees could become infected if they are exposed to these blood-borne pathogens.

The purpose of this Blood-borne Pathogen Exposure Control Plan is to provide the information, procedures, and requirements necessary to prevent employee exposure to blood-borne pathogens.

### **12.1 Regulatory, Requirement, and Policy Compliance**

This Blood-borne Pathogen Exposure Control Plan has been prepared in compliance with:

- ◆ 29 CFR 1910.1030, Blood-borne Pathogens
- ◆ Safety & Health Requirements Manual, EM 385-1-1 (USACE, 3 November 2003), Section A.03.06

### **12.2 Exposure Determination**

OSHA requires employers to perform an exposure determination, identifying employees who may incur occupational exposure to blood or other potentially infectious materials. The exposure determination is made without regard to the use of personal protective equipment. For exposure determination purposes, employees are considered to be exposed, even if they wear PPE.

Activities at this project do not present a high risk of employee exposure to blood or other body fluids. An exception to this would be under circumstances when personnel administer first aid care or CPR to injured workers and when personnel clean-up areas and equipment that may have come in contact with blood as a result of the incident. In these cases, there is reasonable potential for employee skin, eye, mucous membrane, or potential contact with blood or other bodily fluids.

OSHA requires a listing of job classifications with identification of tasks performed in which some employees may have potential for occupational exposure. This requirement is

for employees to clearly understand the tasks that they may perform have a potential for occupational exposure to infectious materials. The job classifications and associated tasks with an exposure potential are as follows:

- ◆ **Site Health and Safety Officer** – Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.
- ◆ **Laborer** – Administer first aid or CPR; decontaminate or disinfect surfaces and articles that have contacted infectious materials, and prepare biohazard waste for temporary storage and subsequent disposal.

These employees have potential for exposure to blood-borne pathogens when administering first aid or CPR and when performing post-accident clean-up operations due to:

- ◆ Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes).
- ◆ Blood splashes to their eyes, nose, or mouth, or other mucous membranes.
- ◆ Punctures through the skin with a contaminated sharp object (i.e., scissors).

Workers can reduce their risk of contacting blood-borne pathogens by implementing the recommended work practices (outlined in this plan) before, during, and after responding to emergency medical incidents primarily involving personal injuries.

### 12.3 Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for HIV, HBV, or other blood-borne pathogens. Universal precautions will be observed to prevent contact with blood or other potentially infectious materials. Universal precautions consist of the following practices:

- ◆ All workers will routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other body fluids is anticipated. Gloves should be worn for touching blood and body fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or body fluids. Masks and protective eye wear or face shields will be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes. Protective suits will be worn during procedures that are likely to generate splashes of blood or other body fluids.
- ◆ Hands and other skin surfaces will be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands will be washed immediately after gloves are removed, using a disinfectant soap.

- ◆ CPR barriers or other ventilation devices will be available for use in areas in which the need for resuscitation is foreseeable.
- ◆ Workers who have exudative lesions or weeping dermatitis will be excluded from handling potentially infectious materials until the condition resolves.
- ◆ Pregnant workers should be especially familiar with and strictly adhere to precautions to minimize the risk of transmission.

#### **12.4 Employee Training Program**

Employees who are first aid/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers as described in HS512, *Handling Blood and Other Potentially Infectious Materials* this SHERP and its addenda, and the general provisions of this procedure.

#### **12.5 Record-Keeping**

There are federal record-keeping requirements for training, medical, and incident reporting documentation. The provisions for keeping these records are contained in the subsections below.

##### **12.5.1 Training Records**

Employees covered under this exposure plan will be trained as required. A record of the training will be appropriately generated. The training record will contain the date of the training session(s), the contents or a summary of the training session(s), the names of persons conducting the training, and the names of all persons attending the training sessions.

The training records will be maintained by ADVENT for at least five years from the training date.

##### **12.5.2 Medical Records**

Medical records necessary for ADVENT employees will include documentation of HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

The employee medical records will be forwarded to and maintained by ADVENT for inclusion in the employee's medical file. Confidentiality of all medical records shall be maintained.

ADVENT maintains employee medical records for the duration of the employee's employment plus 30 years thereafter. If, for whatever reason, ADVENT no longer does business and no successor exists, ADVENT will notify the director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the director of NIOSH.

### **12.5.3 Incident Recording**

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 300 log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or bodily fluids must be immediately reported to the HSM for proper reporting and follow-up.

### **12.6 Plan Review and Update**

This Blood-borne Pathogen Exposure Control Plan will be reviewed and updated on an annual basis.

**Appendix A**  
**Material Safety Data Sheets**

International Safety Cards for potential site contaminants are included in this section, as well as MSDS's for chemicals that may be brought to the site.

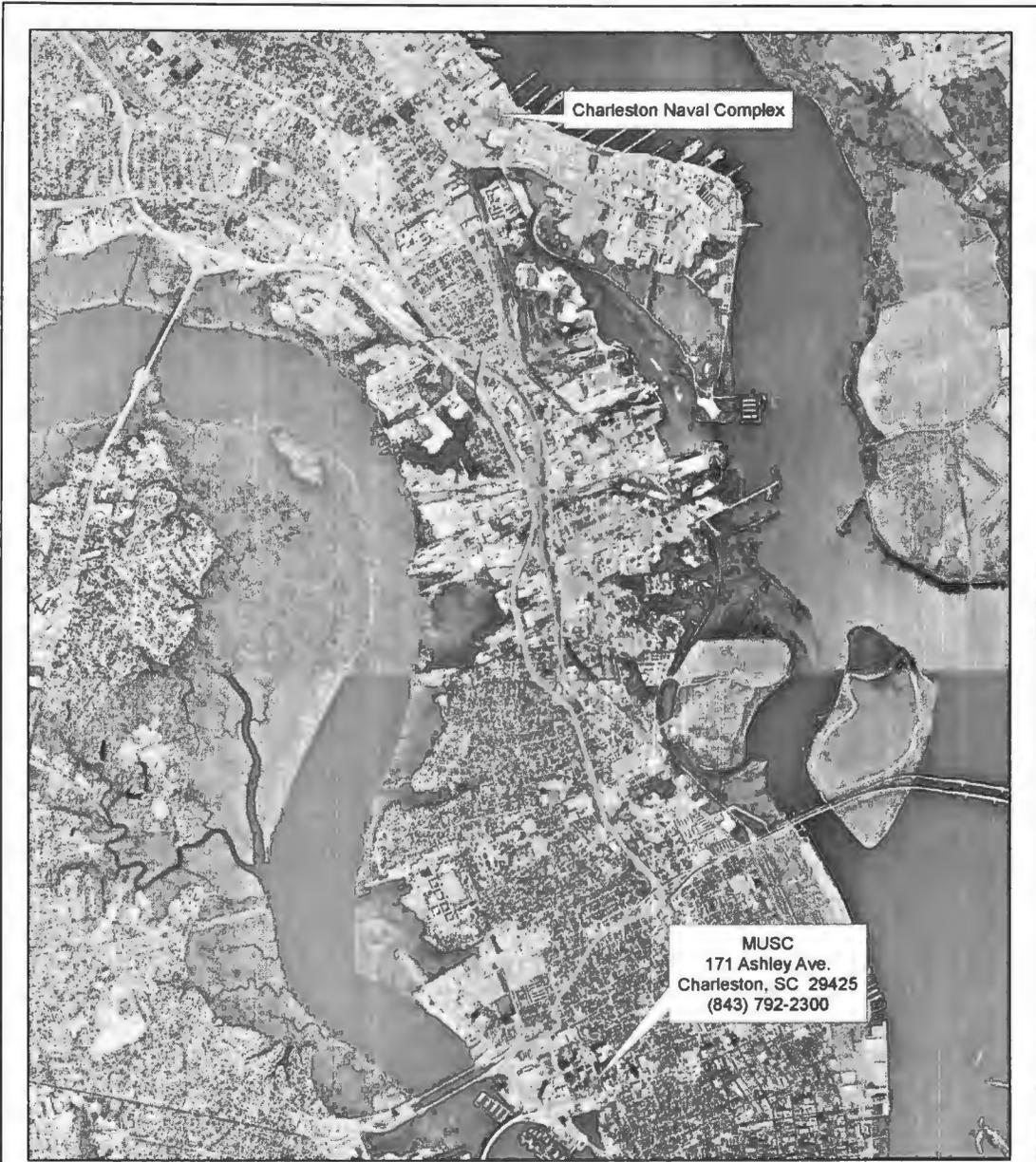
## **Appendix B**

### **Health & Safety Plan Acknowledgement**



## **Appendix C**

### **Route to Hospital**



**Legend**

— hospital\_route

Projection: NAD 1927 UTM Zone 17N  
 Map Scale: 1:40,000  
 Created by: JWW, 10/06/05

0 0.2 0.4 0.8 1.2 1.6  
 Miles  
 N  
 W — E  
 S

**Figure-2**  
**Hospital Route Map**  
**Former CNC**  
**Charleston, South Carolina**

**Appendix D**

**Health and Safety Plan Amendment Form**

**HEALTH AND SAFETY PLAN  
AMENDMENT FORM**

**(Note: All Amendments must be reviewed and approved by the PM)**

**Project Name:** \_\_\_\_\_ **Project No.:** \_\_\_\_\_

**Amendment No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Amendment Revises: Page:** \_\_\_\_\_ **Section:** \_\_\_\_\_

**Task(s) Amendment Affects:\*** \_\_\_\_\_

**Reason For Amendment:**

**Amendment:** *(Attach separate sheet(s) as necessary)*

**Completed by:** \_\_\_\_\_ **Approved by:** \_\_\_\_\_

**Appendix E**

**Accident Prevention Plan**

## **Accident Prevention Plan**

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## Acronym List

ADVENT	ADVENT Environmental, Inc.
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
ASTM	American Society for Testing and Materials
CD	Compact Disc
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CSIR	Contractor's Significant Report
DoD	Department of Defense
EH&S	Environmental Health and Safety
EMR	Experience Modification Rate
EMS	Emergency Medical Services
EZ	Exclusion Zone
HPP	Hurricane Preparedness Plan
HSM	Health and Safety Manager
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Safety and Health
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PPE	Personal Protective Equipment
SSHSP	Site-specific Health and Safety Plan
SS/SHSO	Site Supervisor/ Site Health and Safety Officer
USACE	United States Army Corps of Engineers

**ACCIDENT PREVENTION PLAN SIGNATURE SHEET**

Plan Preparer: \_\_\_\_\_  
Chris L. Brown  
Health and Safety Manager

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

Approved by: \_\_\_\_\_  
Jim Weeg  
Project Manager

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

Concurred by: \_\_\_\_\_  
Kate Hendrickson Borg  
Project Principal

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

## 1.0 INTRODUCTION

The primary site tasks include the following:

- ◆ Soil borings and installation of temporary wells
- ◆ GW sampling
- ◆ Soil sampling

Activity Hazard Analyses (AHAs) have been prepared for the above activities and are included in Section 4.8 of the Site-specific Health and Safety Plan (SSHSP).

Year	Experience Modification Rate (EMR)	OSHA Recordable Incident Rate-Total Cases	OSHA Recordable Incident Rate-Lost Workday	Total Employee-Hours Worked	Number of Employees
2008	0.93	0	0	60645.75	88
2007	0.94	2.96	1.48	135089	152
2006	0.91	5.32	3.55	112729.72	121
2005	1.07	6.36	3.18	62859.5	48
2004	0.97	0	0	46571.95	42
2003	0.95	0	0	17835.9	19
2002	0.95	0	0	25175.56	40
2001	0.83	0	0	52150	NA

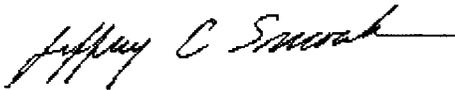
## 2.0 STATEMENT OF HEALTH AND SAFETY POLICY

### Corporate Safety Statement

ADVENT Environmental Inc. is committed to operating all of its projects in a safe, efficient manner and in compliance with all applicable safety, health and environmental regulations. Our goal is to provide an injury free work environment where people, equipment and the environment are not placed at unreasonable risk of injury or damage.

The most valuable resource we have is our people. While quality and productivity are critical to our operations, they will never take precedence over the safety of personnel or protection of the environment. Ensuring the safety of all employees requires diligent planning and a commitment from all levels of the organization. Safety must receive the same level of attention as quality and productivity.

The SSHSP has been developed to guide us in our daily activities. Teamwork and compliance with our safety standards, procedures and rules will help us achieve our goal of an injury free work environment. Cooperation and active participation in ADVENT Environmental Inc.'s safety process is expected and appreciated, anything less is unacceptable.



Jeffrey Smoak, P.E.  
President  
ADVENT Environmental, Inc.

### **3.0 RESPONSIBILITIES AND LINES OF AUTHORITY**

Safety responsibilities, accountability and lines of authority are discussed in Section 2.0 of the SSHSP. The Project Manager (PM), Site Supervisor/Site Health and Safety Officer (SS/SHSO), Health and Safety Manager (HSM), and Project Principal are responsible for formulating and enforcing health and safety requirements, and for implementing the SSHSP.

## **4.0 SUBCONTRACTORS AND SUPPLIERS**

Each subcontractor working on the project site will be required to adhere to the SSHSP and the requirements presented below.

### **4.1 Subcontractor/Supplier Coordination and Control**

All subcontractors may be screened for safety performance and compliance with Federal Alcohol and Drug testing requirements prior to being issued any contract for site work. Subcontractors will comply with the requirements for site safety as outlined in ADVENT's SSHSP. The SS/SHSO will be responsible for the conduct and control of ADVENT subcontractors.

### **4.2 Subcontractor/Supplier Safety Responsibilities**

All subcontractor employees are subject to the same training and medical surveillance requirements (or at least as stringent) as ADVENT personnel depending on job activity. All activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 Code of Federal Regulations (CFR) 1910.120 and 29 CFR 1926.65. All subcontractor personnel will be required to sign in daily and be required to attend a daily meeting discussing operations and safety issues. Subcontractors may be asked to submit AHAs for their work activities to the SS/SHSO. The subcontractor reports directly to the PM. All incidents involving subcontractor employees shall be reported to the SS/SHSO and a copy of the subcontractor's injury/illness report shall be submitted to the SS/SHSO within 24 hours.

Subcontractors are required to read and sign the SSHSP and comply with all requirements of this Accident Prevention Plan (APP). Contractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment/equipment maintenance will comply with all rules and regulations. Supplier personnel will not be permitted into contaminated areas unless training and medical surveillance is in accordance with 29 CFR 1910.120/1926.65. Contractors will not ride on tractors, forklifts or similar vehicles unless specific seats are provided. They will follow facility hot work rules if hot work is required. Trucks will be loaded and unloaded in a safe and effective manner and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of and litter will not be permitted to be scattered or blown from truck beds. Operators of mobile equipment on site must observe all traffic rules such as speed limits and right-of-ways of pedestrians.

## **5.0 TRAINING**

Outlines of the site safety orientation and training for site personnel, subcontractors and visitors are provided in Section 10.0 of the SSHSP.

### **5.1 Mandatory Training and Certifications**

Mandatory training and certifications are discussed in Section 10.0 of the SSHSP.

### **5.2 Emergency Response Training**

ADVENT personnel who have completed the OSHA 40-hour HAZWOPER training are qualified as emergency responders per 29 CFR 1910.120/1926.65 (e)(3)(iv). Site Specific Emergency Response Procedures will be reviewed with all site personnel as a part of site indoctrination.

### **5.3 Supervisory and Employee Safety Meetings**

The ADVENT SS/SHSO will conduct daily safety meetings at the start of each work shift for on-site personnel and will require subcontractors to follow similar meeting procedures or participate in the ADVENT daily safety meetings.

## **6.0 HEALTH AND SAFETY INSPECTIONS**

### **6.1 Inspections**

The SS/SHSO may be responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, and equipment conditions and submitting them to the PM. The SS/SHSO will discuss any necessary corrective actions with the PM and review new procedures. Copies of these reports are maintained on file at the project locations.

The ADVENT HSM representative will periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file at the Mt. Pleasant, SC office and are tracked in a database for each ADVENT PM, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses are compiled and provided to program management for review.

### **6.2 External Inspections/Certifications**

ADVENT does not anticipate, but may consider the use of outside sources, to provide safety inspections on an as necessary basis.

As required, safety equipment will comply with appropriate regulations of OSHA, NIOSH (National Institute for Occupational Safety and Health), ANSI (American National Standards Institute), ASTM (American Society for Testing and Materials), United States Coast Guard (USCG), or other recognized certification organizations.

## **7.0 HEALTH AND SAFETY EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE**

ADVENT considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of zero incidents for all projects. All projects will be conducted in a manner that minimizes the probability of near misses, equipment/property damage or injury. ADVENT may establish programs to recognize people and projects that demonstrate excellence in safety performance. ADVENT will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. ADVENT site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. ADVENT will provide and enforce safety rules to protect employees, subcontractors, clients and the public.

### **7.1 ADVENT Safety Incentive Programs**

Not applicable.

### **7.2 ADVENT Employee Safety Responsibility Requirements**

Each employee is responsible for personal safety as well as the safety of others in the area and is expected to participate fully in the Safety Improvement Process. The employee will use all equipment provided in a safe and responsible manner as directed by the SS/SHSO. All ADVENT personnel will follow the policies set forth in the ADVENT SSHSP. Site personnel concerned with any aspect of health and safety shall bring it to the attention of the SS/SHSO. If not satisfied, they should contact the HSM. All project personnel have the authority to stop work if in their judgment serious injury could result from continued activity. The SS/SHSO shall be notified immediately if this becomes necessary. To protect the health and safety of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination.

### **7.3 Managers and Supervisors Safety Accountability**

It is the duty of the supervisor to motivate employees to adhere to ADVENT's safety policy in each work situation. A first line supervisor for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task.

All supervisors shall have complete knowledge of the safety procedures for all jobs and tasks under their supervision or, when in doubt, shall seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.

Supervisors will:

- ◆ Explain the safety procedure involved with a task to each employee and check randomly to see that the employee understands and works as instructed.
- ◆ Allocate sufficient time for the training and coaching of all employees to insure that everyone knows the correct procedure for safely accomplishing required tasks.
- ◆ Prevent new employees from performing any tasks until required training is completed.
- ◆ Immediately correct unsafe conditions that involve site employees or contractors.
- ◆ Ensure that the employees are outfitted with and wear personal protective equipment (PPE) as specified by this APP, SSHSP, other ADVENT procedures or as directed by the PM.
- ◆ Set a good safety example.

- ◆ Obtain the cooperation of employees and contractors.
- ◆ Provide a safe work environment for employees and contractors.
- ◆ Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- ◆ Report all accidents, near misses and property damage in accordance SSHSP.
- ◆ Establish a safety culture, using the elements of the ADVENT Safety Improvement process, which promotes awareness, encourages participation and recognizes excellence.

## **8.0 ACCIDENT REPORTING**

### **8.1 Exposure Data (Man-hours Worked)**

The HSM tracks and maintains incident records as to Federal reporting requirement. Incident rates are reported monthly. Incident Rates and Workers Compensation losses are tracked for each business line.

### **8.2 Accident Investigations, Reports, and Logs**

The SS/SHSO conducts accident/incident investigations. A report is completed by the SS/SHSO and it must be submitted to the ADVENT PM and HSM.

### **8.3 Immediate Notification of Major Incidents**

ADVENT will immediately notify the client of any major incident, including injury, fire, equipment/property damage, and environmental incident. A full report, including the Contractor's Significant Report (CSIR), will be provided within 24 hours. The following procedure will be followed in response to any major personal injury.

### **8.4 Accident Response**

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make contact with the SS/SSHOO to alert him of a medical emergency situation. The work crew supervisor will apprise the SS/SSHOO the following information:

- ◆ Location of the victim at the work site
- ◆ Nature of the emergency
- ◆ Whether the victim is conscious
- ◆ Specific conditions contributing to the injury, if known.

## **9.0 MEDICAL SUPPORT**

On-site Medical Support/Off-site Medical Arrangements are outlined in Section 9.0 of the SSHSP.

## **10.0 PERSONNEL PROTECTIVE EQUIPMENT**

Protection levels provided in the SSHSP are established for the site work activities based on the levels of site contaminants and the scope of work. Once on-site, results of air monitoring (if applicable) and visual inspection of the work activities may indicate the need for changes in these PPE level(s). Any significant change in the PPE level will be approved by the SS/SHSO in consultation with the PM and HSM.

All personnel using respiratory protection will be cleared by a physician for use of a respirator and will be fit-tested to assure they can achieve an acceptable fit. Physician clearance and results of fit testing will be documented as required by OSHA

## **11.0 PLANS REQUIRED BY THE SAFETY MANUAL**

### **11.1 Hazard Communication Program**

The Site-Specific Hazard Communication Program is included Section 4.0 of the SSHSP. ADVENT Hazard Communication Program complies with 29 CFR 1926.59/1910.1200.

### **11.2 Emergency Response Plans**

The Emergency Response and Contingency Plan is included in Section 9.0 of the SSHSP.

### **11.3 Layout Plans**

Work zones are defined in Section 5.0 of the SSHSP.

### **11.4 Respiratory Protection Plan**

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining the need for use of respirators have been evaluated based on the site contaminants. Air monitoring will be conducted to confirm that respiratory protection levels are adequate. All respirator users will be OSHA trained in proper respirator use and maintenance. The SS/SHSO will observe workers during respirator use for signs of stress. The SS/SHSO and the PM will also evaluate the implementation of the SSHSP, periodically, to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

### **11.5 Contingency Plan for Severe Weather**

Contingency plans for severe weather are included in Section 9.0 of SSHSP.

### **11.6 Alcohol and Drug Abuse Prevention Plan**

It is ADVENT's desire to provide a drug-free, healthful, and safe workplace. To promote this goal, employees are required to report to work in appropriate mental and physical condition to perform their jobs in a satisfactory manner.

While on ADVENT premises and while conducting business-related activities off ADVENT premises, no employee or subcontractor may use, possess, distribute, sell, or be under the influence of alcohol or illegal drugs. The legal use of prescribed drugs is permitted on the job only if it does not impair an employee's ability to perform the essential functions of the job effectively and in a safe manner that does not endanger other individuals in the workplace.

Violations of this policy may lead to disciplinary action, up to and including immediate termination of employment, and/or required to participation in a substance abuse rehabilitation or treatment program. ADVENT reserves the right to contact appropriate law enforcement agencies. Such violations may also have legal consequences.

Under the Drug-Free Workplace Act, an employee who performs work for a government contract or grant must notify ADVENT of criminal conviction for drug-related activities occurring in the workplace. The report must be made within five days of the conviction.

Employees with questions on this policy or issues related to drug or alcohol use in the workplace should raise their concerns with their supervisor without fear of reprisal.

## **12.0 CONTRACTOR INFORMATION TO MEET THE REQUIREMENTS OF THE MAJOR SECTIONS OF EM 385-1-1**

In addition to this APP, ADVENT has prepared a SSHSP to meet the major requirements of United States Army Corps of Engineers (USACE) Manual 385-1-1. Additional procedures for major requirements are provided in the ADVENT Health and Safety Procedures Manual.

**Appendix F**

**OSHA 300 LOG**





# Summary of Work-Related Injuries and Illnesses

**U.S. Department of Labor  
Occupational Safety and Health Administration**

Form approved OMB no. 1218-0176

Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log completely and accurately before completing this summary.

Record individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you

employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or OSHA Form 300A, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Total number of employees with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
(H)	(I)	(J)

Total number of days of job transfer or restriction  
(L)

**Illness Types**

- (4) Poisonings
- (5) Hearing loss
- (6) All other illnesses

Return this form to OSHA from February 1 to April 30 of the year following the year covered by the form.

The collection of information is estimated to average 50 minutes per response, including time to review the instructions, search and gather the data needed, and to review the information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20035. Send the completed forms to this office.

**Establishment Information**

Your establishment name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

Industry description (e.g., *Manufacture of motor truck trailers*)  
\_\_\_\_\_

Standard Industrial Classification (SIC), if known (e.g., 3715)  
\_\_\_\_\_

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)  
\_\_\_\_\_

**Employment Information** (If you don't have these figures, see the Worksheets on the back of this page to estimate.)

Annual average number of employees \_\_\_\_\_

Total hours worked by all employees last year \_\_\_\_\_

**Sign here**

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive \_\_\_\_\_ Title \_\_\_\_\_

( ) / / Phone \_\_\_\_\_ Date \_\_\_\_\_



# Summary of Work-Related Injuries and Illnesses

Year 20\_\_



U.S. Department of Labor  
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

## Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

## Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

## Injury and Illness Types

Total number of ... (M)	
(1) Injuries _____	(4) Poisonings _____
(2) Skin disorders _____	(5) Hearing loss _____
(3) Respiratory conditions _____	(6) All other illnesses _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-5644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

## Establishment Information

Your establishment name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_

Industry description (e.g., Manufacture of motor truck trailers) \_\_\_\_\_

Standard Industrial Classification (SIC), if known (e.g., 3715) \_\_\_\_\_

OR

North American Industrial Classification (NAICS), if known (e.g., 336212) \_\_\_\_\_

**Employment Information** (If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees \_\_\_\_\_

Total hours worked by all employees last year \_\_\_\_\_

## Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive \_\_\_\_\_ Title \_\_\_\_\_

( ) / / \_\_\_\_\_

Phone \_\_\_\_\_ Date \_\_\_\_\_

## Optional

# Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

### How to figure the average number of employees who worked for your establishment during the year:

**1 Add** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = **1** \_\_\_\_\_

**2 Count** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = **2** \_\_\_\_\_

**3 Divide** the number of employees by the number of pay periods.

$\frac{\mathbf{1}}{\mathbf{2}}$  \_\_\_\_\_ = **3** \_\_\_\_\_

**4 Round the answer** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees*.

The number rounded = **4** \_\_\_\_\_

For example, Acme Construction figured its average employment this way:

For pay period...	Some paid this number of employees...		
1	10	Number of employees paid = 830	<b>1</b>
2	0		
3	15	Number of pay periods = 26	<b>2</b>
4	30		
5	40	$\frac{830}{26} = 31.92$	<b>3</b>
▼	▼	26	
24	20	31.92 rounds to 32	<b>4</b>
25	15		
26	+10	32 is the annual average number of employees	
	830		

### How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

### Optional Worksheet

\_\_\_\_\_ **Find** the number of full-time employees in your establishment for the year.

**X** \_\_\_\_\_ **Multiply** by the number of work hours for a full-time employee in a year.

\_\_\_\_\_ This is the number of full-time hours worked.

**+** \_\_\_\_\_ **Add** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

\_\_\_\_\_ **Round** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year*.



# OSHA's Form 301 Injury and Illness Incident Report

**Attention:** This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



**U.S. Department of Labor**  
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by \_\_\_\_\_

Title \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

## Information about the employee

- 1) Full name \_\_\_\_\_
- 2) Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_
- 3) Date of birth \_\_\_\_/\_\_\_\_/\_\_\_\_
- 4) Date hired \_\_\_\_/\_\_\_\_/\_\_\_\_
- 5)  Male  
 Female

## Information about the physician or other health care professional

- 6) Name of physician or other health care professional \_\_\_\_\_  
\_\_\_\_\_
- 7) If treatment was given away from the worksite, where was it given?  
Facility \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_
- 8) Was employee treated in an emergency room?  
 Yes  
 No
- 9) Was employee hospitalized overnight as an in-patient?  
 Yes  
 No

## Information about the case

- 10) Case number from the Log \_\_\_\_\_ (Transfer the case number from the Log after you record the case.)
- 11) Date of injury or illness \_\_\_\_/\_\_\_\_/\_\_\_\_
- 12) Time employee began work \_\_\_\_\_ AM / PM
- 13) Time of event \_\_\_\_\_ AM / PM  Check if time cannot be determined
- 14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. *Examples:* "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."
- 15) **What happened?** Tell us how the injury occurred. *Examples:* "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."
- 16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." *Examples:* "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."
- 17) **What object or substance directly harmed the employee?** *Examples:* "concrete floor"; "chlorine"; "radial arm saw." *If this question does not apply to the incident, leave it blank.*
- 18) **If the employee died, when did death occur?** Date of death \_\_\_\_/\_\_\_\_/\_\_\_\_

**Appendix G**

**HEAT STRESS LOG**



498 Wando Park Blvd Suite 500  
 Mt. Pleasant, SC 29464 (843)  
 388-1851 -FAX: (843) 388-1891  
**Heat Stress Monitoring Record**

Project / Location \_\_\_\_\_ Date \_\_\_\_\_

Employee Name	Initial Reading Time		First Work Period Time		Second Work Period Time	
	WBGT		WBGT		WBGT	
	Air Temp		Air Temp		Air Temp	
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp	Final Temp	Initial Temp	Final Temp	Initial Temp	Final Temp
	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.

**Appendix H**

**TRAINING CERTIFICATIONS**