

FINAL ACCIDENT PREVENTION PLAN

Former Harshaw Chemical Site, Remediation of Operable Units 1 and 2 Cleveland, OH

Contract No: W912P424C0002

Delivery Order W912P423R0019

May 2024

Prepared for:



USACE Buffalo District

478 Main Street

Buffalo, New York 14202

Prepared by:



Enviro-Fix Solutions LLC

1240 Bayshore Highway, Suite 311

Burlingame, California 94010

Phone: 650-347-1555 / Fax: 650-347-8789

This page intentionally left blank.



TABLE OF CONTENTS

TABLE OF CONTENTS	I
LIST OF TABLES	V
LIST OF FIGURES	V
LIST OF APPENDICES	V
ACRONYMS	VI
SIGNATURES.....	VIII
1.0 INTRODUCTION AND OVERVIEW	1
1.1 Purpose.....	1
1.2 Application.....	2
1.3 Revisions	2
2.0 BACKGROUND INFORMATION	4
2.1 Project Description/Scope of Work.....	5
2.2 Project Location.....	5
2.3 Equipment To Be Used	9
2.4 Anticipated High-Risk Activities	10
2.5 Major Phases of Work Anticipated	10
3.0 STATEMENT OF SAFETY AND HEALTH POLICY	13
3.1 Contractor Accident Experience	15
4.0 ORGANIZATION, RESPONSIBILITIES AND LINES OF AUTHORITY	17
4.1 Health and Safety Responsibilities.....	20
4.1.1 EFS Program Manager	20
4.1.2 Project Manager.....	20
4.1.3 Site Safety and Health Manager.....	21
4.1.4 Site Safety and Health Officer.....	21
4.1.5 Field Personnel.....	22
4.1.6 Subcontractors.....	22
4.1.7 Site Visitors	23
4.2 Lines of Authority.....	23
4.3 Competent Persons	23
4.4 Disciplinary Procedures.....	24
4.5 Drug Free Workplace.....	24
4.6 Manager and Supervisor Accountability	24
5.0 MEETINGS AND TRAINING REQUIREMENTS.....	25
5.1 Project Meetings and Training Requirements	25
5.2 Periodic Safety and Health Training for Supervisors and Employees	27
5.3 PPE and Safety Equipment Training	27
5.3.1 Training Certification.....	27
5.4 Site Orientation	27
5.5 Visitor Indoctrination Policy	27



6.0	SAFETY AND HEALTH INSPECTIONS	29
6.1	General Inspection Procedures	29
6.2	External Inspections and Certifications	30
6.3	Follow-up Procedures for Deficiencies	30
7.0	INCIDENT REPORTING AND INVESTIGATION	31
7.1	Incident Summary	31
7.2	Immediate Notification of Major Accidents	32
8.0	PLANS, PROGRAMS, AND PROCEDURES	33
8.1	Fatigue Management Plan	33
8.2	Emergency Response Plan	35
8.2.1	<i>Emergency Contact List</i>	35
8.2.2	<i>Injury and Medical Emergency</i>	39
8.2.3	<i>Fire</i>	40
8.2.4	<i>Evacuation</i>	41
8.2.5	<i>Spills and Releases of Hazardous Materials</i>	42
8.3	Plan for Prevention of Alcohol and Drug Abuse	44
8.4	Site Sanitation Plan	46
8.5	Medical Support Agreement	48
8.6	Bloodborne Pathogen Program with Exposure Control Plan	49
8.7	Automatic External Defibrillator Program	54
8.8	Site Layout Plan	54
8.9	Access / Haul Road Plan	54
8.10	Hearing Conservation Program	54
8.11	Respiratory Protection Plan	56
	<i>Air Monitoring</i>	56
	<i>Respiratory Protection</i>	56
	<i>Respiratory Protection Requirements</i>	57
	<i>Training Requirements</i>	57
	<i>Respirator Cartridge Change-out Schedule</i>	57
	<i>Respirator Inspection and Cleaning</i>	57
	<i>Respirator Fit Testing</i>	57
	<i>Facial Hair</i>	57
	<i>Medical Certification</i>	57
8.12	Health Hazard and Control Program	58
8.12.1	<i>Site Control</i>	58
8.12.2	<i>Utility Avoidance and Protection</i>	59
8.12.3	<i>Mobile Equipment Operations</i>	61
8.12.4	<i>Personal Protective Equipment</i>	62
8.12.5	<i>Utility Vehicles (UTVs)</i>	66
8.13	Hazard Communication Program	67
8.14	Process Safety Management Plan	69
8.15	Lead Abatement Plan	69
8.16	Asbestos Abatement Plan	70
8.17	Radiation Safety Program	70
8.18	Abrasive Blasting Plan	70



8.19	Heat and Cold Stress Monitoring Plan.....	70
8.19.1	<i>Heat Stress and Heat Strain</i>	70
8.19.2	<i>Cold Stress</i>	75
8.20	Indoor Air Quality Management	79
8.21	Mold Remediation Plan	79
8.22	Chromium Exposure Evaluation	79
8.23	Crystalline Silica Monitoring Plan	79
8.24	Night Operations Lighting Plan	85
8.25	Traffic Control	85
8.26	Fire Prevention Plan	85
8.27	Wild Land Fire Management Plan	88
8.28	Arc Flash Hazard Analysis.....	88
8.29	Assured Equipment Grounding Program	88
8.30	Hazardous Energy Control Plan	88
8.31	Standard Pre-lift Plan: Load Handling Equipment	89
8.32	Critical Lift Plan.....	91
8.33	Naval Architectural Analysis-Load Handling Equipment (Floating)	91
8.34	Floating Plant Inspection and Certification.....	91
8.35	Severe Weather Plan for Marine Activities	91
8.36	Emergency Plan for Marine Activities	91
8.37	Man Overboard/Abandon Ship Procedures.....	91
8.38	Float Plan for Launches, Motorboats, and Skiffs	92
8.39	Contingency Plan for Severe Weather (General)	92
8.40	Site Specific Fall Protection Plan.....	94
8.41	Demolition Plan	100
8.42	Rope Access Work Plan	100
8.43	Excavation and Trenching Plan	100
8.44	Emergency Rescue-Tunneling.....	103
8.45	Underground Construction Fire Prevention and Protection Plan	103
8.46	Compressed Air Plan.....	103
8.47	Formwork and Shoring Erection and Removal Plan	103
8.48	Precast Concrete Plan	103
8.49	Lift Slab Plan.....	104
8.50	Masonry Bracing Plan	104
8.51	Steel Erection Plan	104
8.52	Explosives Safety Site Plan.....	104
8.53	Blasting Safety Plan.....	104
8.54	Diving Plan	104
8.55	Safe Practices Manual for Diving Activities	104
8.56	Emergency Management Plan for Diving.....	104
8.57	Tree Felling and Maintenance.....	104
8.58	Aircraft / Airfield Construction Safety and Phasing Plan.....	104
8.59	Aircraft / Airfield Safety Plan Compliance Document	104
8.60	Site Safety and Health Plan.....	104
8.61	Confined Space Program.....	105
8.62	COVID Protection Protocol.....	107



9.0	RISK MANAGEMENT PROCESSES	108
9.1	Activity Hazard Analyses – Policy and Procedure	108
10.0	AWARENESS AND COMMUNICATION.....	109
10.1	Accident Prevention Signs, Tags, and Labels	109
10.2	Daily Safety Briefings	109
10.3	Site Orientation	109
10.4	General Site Rules	109



LIST OF TABLES

Table 1-1	Accident Prevention Plan and its Components
Table 3-1	ECC US OSHA Recordable Injuries and Illnesses
Table 5-1	Project Meetings and Training Requirements
Table 6-1	General Inspection Requirements
Table 8-1	Minimum Toilet Facilities
Table 8-2	Permissible Noise Exposures
Table 8-3	Power Line Safe Distances
Table 8-4	Minimum PPE for All Workers

LIST OF FIGURES

Figure 2-1	Site Location Map
Figure 2-2	OU1 and OU2 Parcel Boundaries
Figure 2-3	Site Layout Plan
Figure 3-1	ECC Corporate Environment, Health, Safety, and Quality Statement
Figure 4-1	Project Organization Chart
Figure 4-2	Team Roles and Responsibilities

LIST OF APPENDICES

Appendix A	Activity Hazard Analyses
Appendix B	ECC Corporate Environment, Health and Safety Standard Operating Procedures (Table of Contents)
Appendix C	EHS Forms
Appendix D	Resumes of Key Safety Personnel
Appendix E	Emergency Contact List
Appendix F	Site Safety and Health Plan
Appendix G	APP Checklist
Appendix H	Radiation Protection Plan
Appendix I	Contamination Control Plan



ACRONYMS

APP	Accident Prevention Plan
ACGIH	American Conf. of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CP	Competent Person
CPR	Cardiopulmonary Resuscitation
CSE	Confined Space Entry
CSP	Certified Safety Professional
CQCP	Contractor Quality Control Plan
dB	Decibel
dBA	Decibel Weighted Average
DFOW	Definable Feature of Work
DQCR	Daily Quality Control Report
ECC	Environmental Chemical Corporation
ECCONET	ECC's intranet website
EFS	Enviro-Fix Solutions LLC
ESH&Q	Environment, Safety, Health, and Quality
ESQ	Environment, Safety and Quality
HIPO	High Loss Potential
HSO	Health and Safety Officer
LEL	Lower Explosive Limit
MSHA	Mine Safety and Health Administration
NIOSH	National Institute of Occupational Safety & Health
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
QC	Quality Control
SDS	Safety Data Sheet
SHM	Project Health and Safety Manager
SOP	Standard Operating Procedure
SOW	Scope of Work
SS	Site Superintendent
SSHPP	Site Safety & Health Plan
SSHO	Site Safety and Health Officer
TLV	Threshold Limit Value
TO	Task Order
TWA	Time Weighted Average
U.S.	United States



USACE
UTV


United States Army Corps of Engineers
Utility Vehicle




SIGNATURES

This Final Accident Prevention Plan (APP) has been prepared by Enviro-Fix Solutions, LLC (EFS) to describe the processes, hazards and safety, and occupational health requirements for the Former Harshaw Chemical Project, in Cleveland, Ohio. Work conducted under this contract will be performed in accordance with applicable federal, state, and local safety and occupational health laws and regulations including Occupational Safety and Health Administration (OSHA) standards, including 29 Code of Federal Regulations (CFR) 1910 and 1926, and the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, 15 November 2014). The contents of the APP are subject to review and revision as new information becomes available.


Plan Preparer:

	6/3/24	757-435-5384
Kym Edelman, CIH, CSP Corporate Safety Director/SHM	Date	Phone

Plan Approver:

	6/3/24	910-915-9679
Nicholas Rood, CSP Safety Manager	Date	Phone

Plan Concurrence:

 Digitally signed by Rick Woodworth Date: 2024.06.03 08:56:17 -04'00'	6/3/2024	215-776-0629
Rick Woodworth Sr. Project Manager	Date	Phone



This page intentionally left blank.



1.0 INTRODUCTION AND OVERVIEW

This Former Harshaw Chemical Company Site Project Final Accident Prevention Plan (APP) has been prepared by Enviro-Fix Solutions LLC (EFS) under the Single Award Task Order Contract (SATOC) Number (No.): W912P4-24-C0002, Delivery Order No. W912P4-23-R0019 for the United States Army Corps of Engineers (USACE) Buffalo District. The USACE solicited environmental services to perform the project entitled: Remediation of Operable Units 1 and 2, Former Harshaw Chemical Company Site, Cleveland, OH. The site is included in the government's Formerly Utilized Sites Remedial Action Program (FUSRAP).

The purpose of this plan is to provide guidance for utilizing the proper methods to remediate FUSRAP-contaminated soils at the site in accordance with the Record of Decision for Operable Unit (OU)-1 and OU-2. Project work will be performed in accordance with the Performance Work Statement dated January 2023, REV 1.

EFS is an LLC made up of two member firms: Environmental Chemical Corporation (ECC) and Perma-Fix Environmental Services, Inc. (Perma-Fix). EFS is supported by three primary team members, Civil & Environmental Consultants (CEC), Leidos Engineering Co. (Leidos) and Ontario Specialty Contracting, Inc. (OSC). Several of the attached documents (such as the ECC Corporate Standard Operating Procedures [SOPs] referenced in **Table 1-1**) were created by ECC; however, all such ECC documents contained in this plan, are also applicable to EFS for this project.

1.1 Purpose

This APP has been developed based on known and anticipated hazards that may arise during performance of this project. This APP defines the health and safety requirements for this project through several components that together define the Safety and Health Program for this project. These components are summarized in **Table 1-1**.


Table 1-1 Accident Prevention Plan and its Components

Document	Purpose
APP	<ul style="list-style-type: none"> The APP provides general safety and health requirements and practices. These requirements are in Sections 1 through 11 of the APP.
AHAs	<ul style="list-style-type: none"> The AHAs address specific hazards and precautions for major activities of the project/task order. AHAs are listed in Section 10 and are included as Appendix A.
Radiation Protection Plan	<ul style="list-style-type: none"> Protection from radiation.
ECC Corporate SOPs	<ul style="list-style-type: none"> SOPs are referenced in the APP and are used in conjunction with supplemental plans included as attachments to this APP. ECC SOPs are listed in Appendix B and are accessible on ECC's intranet page (ECCONET) from the project site.
Supplemental Plans	<ul style="list-style-type: none"> Supplemental plans required by EM 385 1-1 to address the health and safety requirements of various activities. Not all of these documents are included in this APP. These plans will be developed by the project management team and made specific to the site and scope of the task. These plans, will be submitted, when applicable, and will be provided at the preparatory meeting for that specific definable feature of work (DFOW).

Notes:

AHA = Activity Hazard Analysis

APP = Accident Prevention Plan

SOP = Standard Operating Procedure

1.2 Application

The requirements established by this APP are mandatory and apply to all EFS employees, subcontractors and any other personnel entering designated work areas at the project site during the execution of field operations. Personnel shall sign off on the APP Compliance Agreement Form after receiving training on this plan and before working at the site. In addition, EFS shall provide a copy of this plan, if requested, to any authorized personnel who must enter the work area.

1.3 Revisions

Changes in the SOW, field changes, or unanticipated site conditions may require APP modification and approval in order to retain safety compliance with contract requirements and OSHA regulations. All changes to this APP shall be prepared and/or reviewed by EFS's SHM (Project Health and Safety Manager) and submitted to the contract Project Manager. Revisions to EFS/ECC SOPs require EFS/ECC Corporate approval. Revisions will be submitted to the designated USACE representative for acceptance, if required.



This page intentionally left blank.



2.0 BACKGROUND INFORMATION

This section presents a brief description of the project including site description, scope of services, key personnel and phases of work.

Contractor: Enviro-Fix Solutions LLC (EFS)
Contract number: W912P4-24-C0002
Project Name: Former Harshaw Chemical Company Site, Cleveland, Ohio

The site is located at 1000 Harvard Avenue in Cleveland, Ohio, three miles south of downtown Cleveland. It is a 55-acre property that includes several developed and undeveloped land parcels near the intersection of Harvard Avenue and Jennings Road. Developed parcels include former production areas with foundations, parking areas associated with demolished buildings, and redeveloped, privately-owned commercial properties. Industries and commercial businesses surround the site. Neighboring industries include Cleveland-Cliffs Inc. (formerly Arcelor Mittal Steel), Howmet Aerospace (formerly Aluminum Company of America (Alcoa Corporation)), Chemical Solvents, Inc., and CSP Fabricating. There are also a few private residences near the site.

The site is separated into two operable units (OUs) and an investigative area (IA) for environmental remediation associated with FUSRAP. OU-1 is located north of Big Creek and west of the Cuyahoga River. Former buildings in this area have been removed. The southern section contains a property developed for truck and equipment servicing. The remainder is undeveloped industrial properties, open fields and wooded areas. OU-2 is south of Big Creek and west of the Cuyahoga River. It mainly consists of undeveloped industrial properties and open fields. A municipality-owned property and a trucking company are in the northwest section. The southern section contains a closed solid waste landfill. IA-06 is an undeveloped parcel located east of the Cuyahoga River and north of Harvard Avenue. Remediation of this area is not required.

The Harshaw, Fuller and Goodwin Company acquired the property in 1905 from the Canadian Copper Company. It operated the property until 1983 when its then parent, Gulf Oil and Kaiser Clay and Chemical, formed the Harshaw/Filtrol partnership. Chevron Chemical Company became a partner in 1985. Chevron sold its share of the Harshaw/Filtrol partnership, except Building G-1, to Kaiser in 1987. In 1998, the Engelhard Corporation purchased the entire site, except for Building G-1, which remained owned and operated by the Chevron/Kaiser Partnership. In 2006, BASF purchased the site, except for Building G-1, which remained owned and operated by the Chevron/Kaiser Partnership (now BGD Company).

Between 1944 and 1953, the MED and Atomic Energy Commission (AEC) used the site to process uranium. The primary production process involved refining of uranium oxide feed material to produce uranium tetrafluoride (green salt), uranium hexafluoride, and uranium trioxide. The uranium processing operations were conducted in Building G-1.



2.1 Project Description/Scope of Work

This Former Harshaw Chemical Site Project APP has been prepared by EFS under Contract No.: W912P4-24-C0002, for the USACE Buffalo District.

Under this SATOC, the EFS Team will furnish all labor, materials, equipment, technical services, and supervision including, but not limited to:

- Preparation of site-specific work plans and other required pre-construction submittals.
- Mobilizing to the site and setting up construction equipment and facilities.
- Sampling and laboratory analysis.
- Collecting, treating and discharging water from the exclusion zone and contaminant reduction zone.
- Monitoring industrial hygiene/health and safety of site workers.
- Implementing contamination control measures and monitoring their effectiveness.
- Excavating, categorizing, and staging of excavated materials
- Packaging, transporting and disposing of FUSRAP-contaminated material off-site.
- Staging and management of non-FUSRAP impacted material for turnover to property owners at project completion.
- Packaging, transporting and disposing universal, hazardous, industrial and “household” waste generated from remediation activities (i.e., vehicle fluids, office trash, etc.) off-site.
- Performing confirmation sampling and final status surveys of remediated areas.
- Providing engineering, surveying and quality control inspections/monitoring.
- Developing, operating and maintaining an electronic file sharing system and database that is compatible with the USACE Information Technology network.
- Assisting USACE with preparation for and participation at public meetings.
- Restoring excavated areas, material handling areas and support zones.

2.2 Project Location

The site is located at 1000 Harvard Avenue in Cleveland, Ohio, three miles south of downtown Cleveland (**Figure 2-1**). It is a 55-acre property that includes several developed and undeveloped land parcels near the intersection of Harvard Avenue and Jennings Road. Developed parcels include former production areas with foundations, parking areas associated with demolished buildings, and redeveloped, privately-owned commercial properties. Industries and commercial businesses surround the site. Neighboring industries include Cleveland-Cliffs Inc. (formerly Arcelor Mittal Steel), Howmet Aerospace (formerly Aluminum Company of America (Alcoa Corporation)), Chemical Solvents, Inc., and CSP Fabricating. There are also a few private residences near the site.

Site maps showing boundaries for OU1 and OU2 of the former Harshaw Chemical Site is presented as **Figure 2-2**.



**Figure 2-1
Site Location Map**

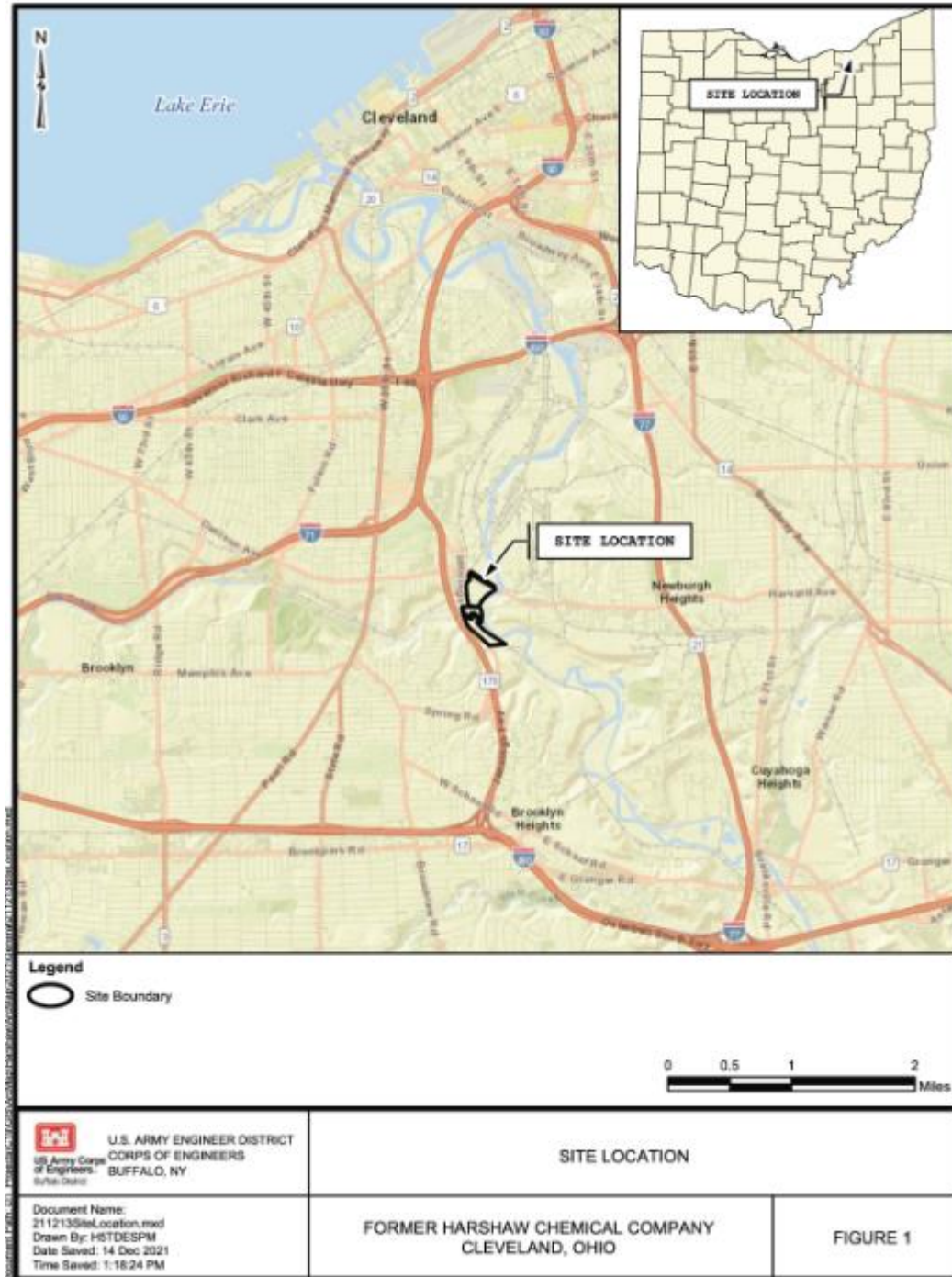




Figure 2-2
OU1 and OU2 Parcel Boundaries

OU1

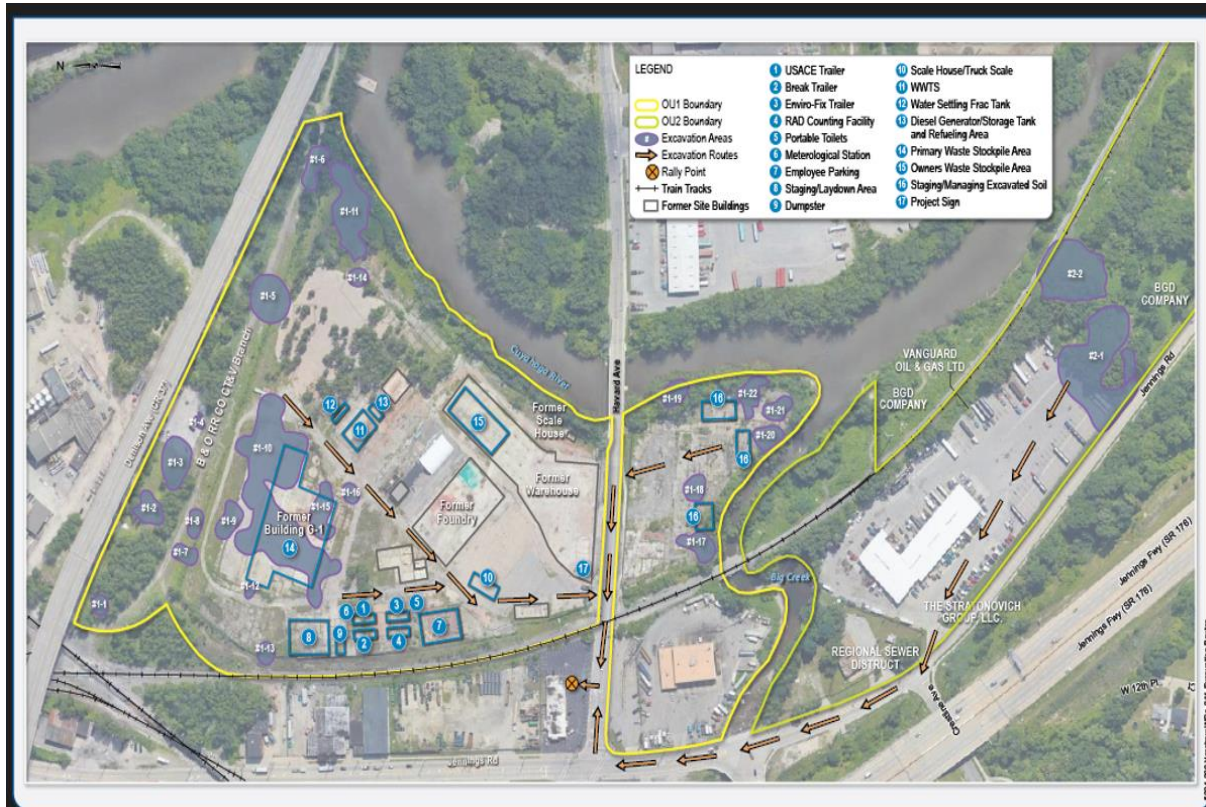




OU2



**Figure 2-3
Site Layout Plan**



2.3 Equipment To Be Used

Major equipment to be used on this project includes:

- Excavators / Loaders
- Dump Trucks
- Pumps
- Generators
- Tanks
- Waste Water Treatment Plant
- Roll-off containers
- Truck Scale
- Soil Sampling and Air Sampling Equipment
- Radiation Monitoring Equipment



2.4 Anticipated High-Risk Activities

Activities to be conducted that can be considered high risk are the use of heavy equipment and potential exposure to radiation and chemical contamination.

2.5 Major Phases of Work Anticipated

The major phases of work for this project include the following:

- Mobilization and site preparation
- Air monitoring
- Clearing and Grubbing
- Subsurface investigations of data gaps for improved characterization of excavation areas
- Monitoring, Sampling, Testing, and Analysis of various media, including soil, water, and debris
- As-required demolition of pavement and building slabs / foundations
- Excavation and management for off-site disposal of impacted soils
- T&D of FUSRAP contaminated soils and debris
- Groundwater collection and containment
- Stockpile management
- Operation of on-site temporary water treatment process for potentially impacted groundwater and construction-generated water
- Groundwater monitoring well decommissioning and installation of new wells
- Backfill and site restoration; and
- Final status survey
- Demobilization

Government specifications applying to this project include the following:

Section	01 01 01 REAL ESTATE
Section	01 32 01.00 10 PROJECT SCHEDULE
Section	01 33 00 SUBMITTAL PROCEDURES
Section	01 35 13.43 10 SPECIAL PROJECT PROCEDURES
Section	01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS
Section	01 35 29.13 HEALTH SAFETY & EMERGENCY RESPONSE PROCEDURES FOR CONTAMINATED SITES
Section	01 35 45 CHEMICAL DATA QUALITY CONTROL
Section	01 45 00.00 10 QUALITY CONTROL
Section	01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
Section	01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS
Section	01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL
Section	01 58 00 PROJECT IDENTIFICATION
Section	02 32 00 SUBSURFACE DRILLING, SAMPLING, AND TESTING
Section	02 41 00 DECONSTRUCTION
Section	02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED



	MATERIAL
Section	02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIAL
Section	31 11 00 CLEARING AND GRUBBING
Section	32 92 19 SEEDING
Section	33 51 39 MONITORING WELLS



This page intentionally left blank.



3.0 STATEMENT OF SAFETY AND HEALTH POLICY

The ECC Corporate Environment, Safety, Health, and Quality (ESH&Q) statement is presented in **Figure 3-1**. The statement will be posted at the job site on the safety and health bulletin board and in other applicable locations.

The safety goal for this project is zero loss incidents, and zero incidents with a high potential for loss. EFS will strive to complete the project without any injuries, significant property damage incidents, reportable environmental releases, or quality defects requiring re-work.

Objectives to meet this goal include:

- Conduct client kickoff meeting before the start of the project;
- Hold subcontractor pre-construction meetings before work begins;
- Implement the three-phase quality control (QC) system;
- Conduct site orientation, including review of this APP with all project participants;
- Use only trained and qualified workers;
- Generate Activity Hazard Analyses (AHAs) for all major Definable Features of Work (DFOW) and train workers in AHA content;
- Perform daily worksite inspections;
- Conduct daily Plan-of-the-Day and Safety Tailgate Meetings;
- Hold workers accountable for following hazard controls listed in the AHA;
- Hold monthly project EFS and Subcontractor management safety meetings;
- Conduct inspections by qualified Safety and Health personnel; and
- Employee participation activities such as milestone recognition.



Figure 3-1

ECC Corporate Environment, Safety, Health, and Quality Statement



Environment, Safety, Health, and Quality Policy

Fundamental Environment, Safety, Health (ESH) and Quality goals of ECC and its subsidiaries are to protect and mitigate our impact on the environment, to ensure the health, safety, and well-being of our employee owners and partners, and to exceed the quality expectations of our clients. To achieve these goals, we commit to:

Visible Leadership: Maintain a culture where everyone provides visible ESQ leadership and management "Models the Way"

Partner Alignment: Align with partners that share our core values
Optimizing Teams: Maximize performance by ensuring that team members have the capability, qualifications, training, and attitudes

Risk Management: Assess risk, plan thoroughly, and execute work in a manner that effectively manages risks and mitigates environmental impacts

Meaningful Involvement: Provide the means and methods for involvement of employees and partners in environmental, safety, and quality control program implementation

Environmental Stewardship: Integrate sound environmental work practices and programs into our operations and promote environmentally friendly lifestyles

Wellness: Provide resources and foster an environment that reflects our high regard for the physical and mental wellbeing of our employees

Compliance: Comply with all applicable policies, procedures, contract requirements, laws, standards, and regulations

Positive Recognition: Provide positive recognition and rewards for outstanding individual and team performance

Continuous Improvement: Monitor and measure, learn from events and trends, communicate, and act to improve our work processes and results

With everyone's participation, we will achieve these goals, fulfill our commitments, and satisfy our clients within a work culture that strives for performance excellence and total project success.

JANUARY 2022

NEVER COMPROMISING SAFETY



Manjiv S. Vohra
President & CEO



August Ochabauer
Vice President



Bud West III
Vice President



Kym Edelman, CIH, CSP
Corp. Safety Director



Marquez Cadet, PE
Corp. Quality Director



3.1 Contractor Accident Experience

As shown in **Table 3-1**, ECC has an excellent safety record. ECC's Experience Modification Rate (EMR) is less than 1.0, indicative of fewer injuries and claims compared to other construction companies. The OSHA Recordable Injury Rate (RIR) is also less than the industry averages (2021 Bureau of Labor Statistics data) in North American Industrial Classification System (NAICS) Code 2362, Non-residential Building Construction and 56291, Remediation.

Table 3-1 ECC OSHA Recordable Injuries and Illnesses

Data through 12/31/2023	2017	2018	2019	2020	2021	2022	2023	BLS Nat Avg	BLS Nat Avg
								Remediation	Non-Res Bldg. Const.
								56291 (2021)	236210 (2021)
Work Hours	533,274	523,449	635,429	732,948	742,073	704,724	744,534		
Total Recordable Cases	1	0	1	1	1	1	4		
Total Recordable Rate	0.38	0	0.31	0.27	0.27	0.28	1.07	2.4	1.9
DART Cases	1	0	0	1	1	0	0		
DART Rate	0.38	0	0	0.27	0.27	0	0	1.9	1
Days Away Cases	1	0	0	0	0	0	0		
Days Away Rate	0.38	0	0	0	0.0	0.0	0.0	1	0.6
Interstate Experience Modification Rate (EMR)	0.7	0.74	0.75	0.73	0.71	0.71	0.71		



This page intentionally left blank.



4.0 ORGANIZATION, RESPONSIBILITIES AND LINES OF AUTHORITY

EFS and its subcontractors are responsible for implementing this APP. Personnel responsibilities for project safety and the lines of authority of these safety personnel are described below. Refer to **Figure 4-1** depicting the Environmental Health and Safety (EHS) organization structure for this project. The Resume of the Site Safety and Health Officer (SSHO) is provided in **Appendix D**.

EFS, as the prime contractor, is the “controlling authority” for all work site safety and health of the subcontractors. EFS is responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.

Stop Work Authority

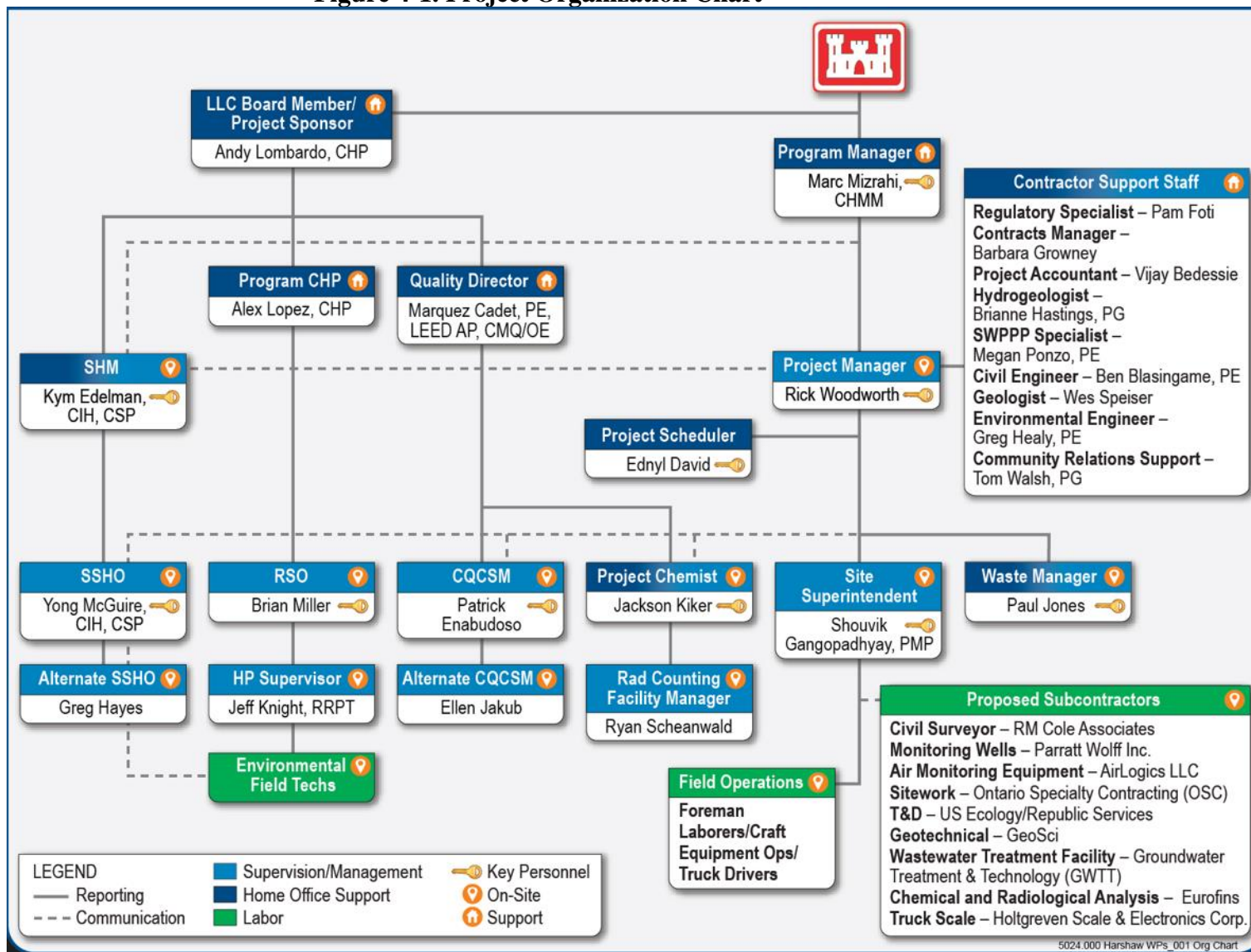
All site personnel possess Stop Work Authority with the expectation and responsibility to stop unsafe work, correct unsafe conditions, and report all such events immediately to their supervisor. Any condition that cannot be corrected immediately must be reported, the condition stabilized, and a mitigation plan developed.



This page intentionally left blank



Figure 4-1. Project Organization Chart





4.1 Health and Safety Responsibilities

The following sections describe the key personnel involved in this project and their responsibilities. To achieve the goals of the APP, each individual must fulfill their responsibilities and comply with the health and safety requirements. Failure to do so could result in removal from the site.

No work will be conducted on the site without the presence of the SSHO. Pre-task analysis (AHA, daily tailgate, Job Safety Analysis) will be conducted prior to doing work.

4.1.1 EFS Program Manager

The Program Manager reports through Program Director to the Chief Operating Officer.

The Program Manager, Marc Mizrahi, represents all aspects of work under the contract and is responsible for the following:

- Providing leadership by setting an example for all site personnel through actions and words regarding the importance of proper health and safety practices and holding project staff accountable for safety performance;
- Ensuring an adequate project budget is available to implement the APP;
- Ensuring that subcontractor Statements of Work include appropriate safety provisions and expectations;
- Conducting general safety inspections during site visits and at least once per quarter;
- Participating in the investigation of unplanned events, high loss potential incidents, and accidents;
- Ensuring that unplanned events, high loss potential incidents, and accidents are properly reported to USACE and EFS's ESQ reporting network;
- Notifying the ESQ Manager of any changes in the SOW or site conditions; and
- Ensuring that the APP is updated to address new hazards.

4.1.2 Project Manager

The Project Manager (PM) reports through Program Director to the Chief Operating Officer.

The PM, Rick Woodworth, represents EFS in all aspects of work under the contract and is responsible for the following:

- Providing leadership by setting an example for all site personnel through actions and words regarding the importance of proper health and safety practices and holding project staff accountable for safety performance
- Ensuring adequate resources are available to implement the APP
- Ensuring that subcontractor Statements of Work include appropriate safety provisions and expectations
- Ensuring that mishaps are properly reported to the USACE Representative and EFS's ESQ reporting network



- Notifying the Project Safety and Health Manager (SHM) of any changes in the SOW or site conditions
- Ensuring that the APP is updated to address new hazards

4.1.3 Site Safety and Health Manager

The SHM reports to the Vice President of Operations.

The Project SHM, Kym Edelman, will oversee the overall project health and safety structure and implementation. The SHM is supported by Nick Rood, CSP, Program Safety Manager. The Project SHM is responsible for the following:

- Reviewing and signing the APP prior to submittal, and approving any modifications
- Developing and/or reviewing AHAs prepared for the project
- Approving the appointment of the SSHO and ensuring that the SSHO has the appropriate training and competencies to perform all expected duties
- Being available on a 24-hour basis for consultation with the SSHO during on-site emergencies or as needed
- Providing on-site consultation as needed to ensure the APP is fully implemented
- Conducting general safety inspections during site visits and at least once per quarter
- Participating in the investigation of mishaps
- Evaluating air monitoring data and recommending changes to engineering controls, work practices, and personal protective equipment (PPE)
- Assisting in development of on-site training, which will be provided by the SSHO.

4.1.4 Site Safety and Health Officer

The SSHO reports to the PM and Project SHM.

The SSHO, Yong McGuire, will implement the APP. In accordance with USACE EM 385-1-1, the SSHO must have completed the 30-hour OSHA Construction Safety course, the 30-hour General Industry Safety course, or an equivalent course meeting the 30-hour training objectives; 8 hours of safety and health coursework every year; and at least 5 years' experience in construction or general industry safety or 4 years' experience plus a third party, nationally accredited safety and occupational health certification.

The SSHO will be responsible for:

- Serving as the general site CP (Competent Person) for safety and health (EM 385-1-1 01.A.17 and 29CFR 1926.20(b) (2)). No work will be done unless the SSHO is on site
- Overseeing compliance with the APP procedures and OSHA regulations through informal daily inspections
- Developing (or assisting subcontractors with the development of) project specific AHAs before work begins
- Conduct daily tailgate safety meetings.



- Reporting to the site on a full-time basis for the duration of field activities
- Serving as a member of the Quality Control (QC) staff on matters relating to safety and health
- Stopping work if unacceptable safety and health conditions exist and taking necessary action to re-establish and maintain safe working conditions
- Consulting and coordinating modifications to the APP with the Project SHM, EFS PM and designated representative
- Ensuring all site personnel and visitors are properly trained in site hazards
- Conducting air monitoring and preparing air monitoring reports
- Conducting site safety surveys and maintaining deficiency logs
- Ensuring accidents are reported, investigated, and corrective actions are implemented
- Monitoring decontamination methods to determine effectiveness
- Ensuring proper training on PPE usage and monitoring the effectiveness of the PPE program
- Maintaining all required safety and health records (e.g., OSHA 300 Logs, incident/accident reports, training certificates and qualifications, equipment checklists, safety plans, air monitoring data and reports) throughout the life of the project.

4.1.5 Field Personnel

Field personnel report to the Project Manager.

Field personnel are responsible for understanding and abiding by the APP and performing work in a safe and responsible manner. Specific responsibilities include the following:

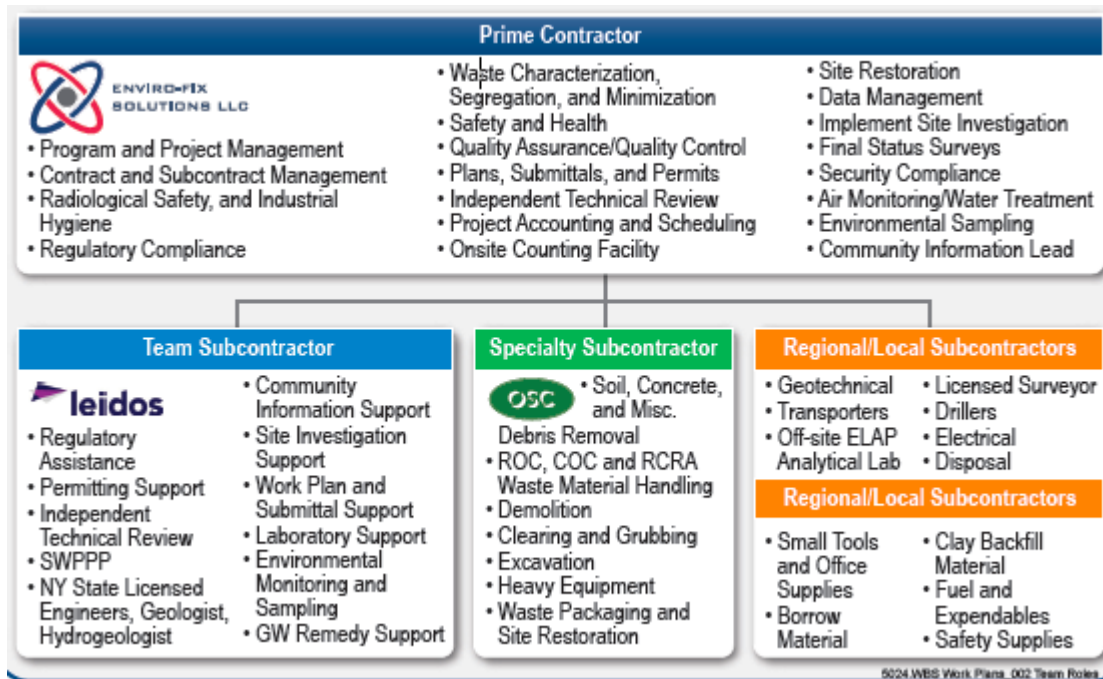
- Acting in a responsible manner at all times in order to prevent incidents, injury, and exposure to themselves and co-workers;
- Reporting all incidents, including near misses, and hazards to the Supervisor or SSHO;
- Attending and participating in all daily health and safety tailgate meetings;
- Following the instructions and directions of the SSHO and Supervisor;
- Utilizing the PPE provided;
- Following all field safety procedures for safe work practices;
- Performing tasks as instructed (unless the individual feels unqualified to perform the task(s) safely);
- Conducting work in a manner compliant with the APP and AHAs; and
- Reporting any personal condition that could affect their safety and/or the safety of coworkers (e.g., fatigue, drowsiness, illness, impairment by medications, influence by drugs or alcohol, emotional stress).

4.1.6 Subcontractors

Team Roles and Responsibilities, including subcontractor firms that are expected to participate in this project, are described in **Figure 4-2**.



Figure 4-2 Team Roles and Responsibilities



4.1.7 Site Visitors

Site visitors will be responsible for the following:

- Participating in a site briefing before leaving the administrative office or site entry point,
- Following all site rules and instructions,
- Being escorted at all times unless otherwise approved by the SSHO and Wearing appropriate PPE.

4.2 Lines of Authority

The SSHO has a technical and administrative reporting relationship to the SHM, who reports directly to the Program Manager. The reporting relationship provides for access to safety and health expertise. Also, it provides an independent reporting line of communication.

Additionally, the SSHO has a functional reporting relationship to the Project Manager and the project team. The SSHO will perform daily and weekly health and safety inspections and provide general support to the Project Manager for health and safety issues.

4.3 Competent Persons

The SSHO serves as the general Competent Person, per EM 385-1-1 01.A.17 and 29 CFR 1926.20(b) (2). Competent Persons for specific activities will be designated in the AHAs for those activities, prior to the start of work.



4.4 Disciplinary Procedures

All employees are required to comply with APP policies and procedures. EFS reserves the right to discipline or terminate (when justified) employees at its sole discretion for serious safety infractions. Discipline will be in accordance with the Disciplinary Policy described in the ECC Employee Handbook, which describes a progressive disciplinary procedure, but allows for immediate termination for serious or egregious infractions. EFS expects that all subcontractors will exercise proper discipline or terminate its employees at its sole discretion when justified. EFS retains the right to deny access to the site to any individual not compliant with safety requirements, in accordance with our subcontract agreement.

A three Strike Disciplinary process will be used where during identification of the first violation the worker will be given a written notice and provided with re-training, if appropriate. After identification of a second safety violation for the same or similar safety rule, the worker will be given days off from work without pay. After identification of a third safety violation for the same or similar safety rule, the worker will be removed from the job site and not allowed to return.

4.5 Drug Free Workplace

EFS prohibits the use, sale, dispersal, possession, or manufacture of illegal drugs, narcotics or alcoholic beverages on its premises. This prohibition also covers all legal or prescription drugs that impair an employee's ability to perform his/her job safely or properly.

4.6 Manager and Supervisor Accountability

EFS managers and supervisors are accountable for providing a safe work environment through proper staffing, training, equipment availability, and by setting a leadership example for safety. Annual performance reviews and incentive plans for managers and supervisors include assessments of project safety performance as well as the individual's demonstrated attitude toward safety.



5.0 MEETINGS AND TRAINING REQUIREMENTS

All EFS and subcontractor project personnel will have the training and certifications required to complete the Project. The onsite SSHO will maintain a training matrix to track all site personnel required training.

5.1 Project Meetings and Training Requirements

The training listed in **Table 5-1** will be provided to project personnel as noted. In addition to the topics listed below, the SSHO (in cooperation with the Site Supervisor), may identify additional topics and work tasks to be included in the training requirements. These special requirements may be noted on Project AHAs requiring additional training. All required training will be documented utilizing a training matrix and this documentation maintained onsite.

Table 5-1 Project Meetings and Training Requirements

Topic	Description	Trainer	When Conducted	Personnel
General Training				
Site Orientation	Review of the hazards, emergency procedures (medical, fire), required Personal Protective Equipment (PPE), incident reporting, accident prevention, applicable Activity Hazard Analyses (AHAs)	Site Safety and Health Officer (SSHO)	Prior to working on the project	All project personnel
Accident Prevention Plan (APP)	Review of APP requirements during site orientation.	SSHO	Before beginning field work	All project personnel
AHAs	Activity-specific hazards, controls, and training requirements for a specific phase or activity.	SSHO, task supervisor	Before beginning specific tasks	Workers, supervisors, and oversight personnel engaged in the activity
Emergency Action Planning	Roles, responsibilities, recognition of emergency conditions, reporting and notification, evacuation, and other procedures.	SSHO	Before beginning field work	All project personnel, with detailed information on procedures for workers with special responsibilities
Hazard Communication	Requirements for Safety Data Sheets (SDSs) and labels; hazards of site materials and controls; signs and symptoms of exposure; location of and access to Hazardous Materials.	SSHO	Before beginning field work	All project personnel potentially exposed to hazardous materials
Hazardous Waste Operations and Emergency Response (HAZWOPER)	Occupational Safety and Health Administration (OSHA) and other Federal and State requirements and Site Safety and Health Plan (SSHP) Review	Qualified Trainer	Initial (40 hour) Annual (8 hour)	All Project personnel involved in Hazardous, Toxic, and Radioactive Waste (HTRW) Work



Topic	Description	Trainer	When Conducted	Personnel
Fire Protection and Prevention	Requirements of the Fire Protection and Prevention Plan, general education on selection, distribution, and proper use of fire extinguishers.	SSHO	Before beginning field work; as necessary to document extinguisher training	All project personnel. Fire extinguisher use for personnel designated as Fire Watch (other personnel as deemed necessary)
OSHA 30-hour construction or equivalent	Common hazards, controls, and OSHA requirements for construction activities.	Authorized OSHA Trainer	Prior to beginning field work	SSHO, Project Superintendent, Construction Manager
Daily Safety Briefing	Review of Plan-of-the-Day and daily hazards; presentation of a specific topic; refresher training on various issues; and changes in hazards, controls, or procedures, Lessons Learned, Immediate & Basic Causes of incidents	SSHO, Site Superintendent	Daily, prior to work	All field workers, supervisors, and field oversight personnel
Weekly Safety Meeting	Incidents, modifications to APP, upcoming work, new hazards, etc.	SSHO, Site Superintendent	Weekly	All field workers, supervisors, and field oversight personnel
<i>Special Training</i>				
First aid/ Cardiopulmonary Resuscitation (CPR)	Principles and techniques for First Aid and CPR	Red Cross, American Heart Association, or other authorized provider	Prior to beginning field work	At least two project personnel
Fall protection	Fall (from elevation) hazards, fall protection techniques, proper use of personal fall arrest systems and rescue procedures.	SSHO, other qualified instructors	Prior to work at elevation	Task-specific, workers exposed to fall hazards
Lock-out/Tag-out (LOTO)	Site-specific energy control and verification procedures.	SSHO, other qualified instructors	Prior to utilization of LOTO procedures	Authorized personnel working on de-energized systems, and affected employees whose work may be impacted by a LOTO situation
Daily Safety Briefing	Review of Plan-of-the-Day and daily hazards; presentation of a specific topic; refresher training on various issues; and changes in hazards, controls, or procedures.	SSHO, Site Superintendent	Daily, prior to work	All field workers, supervisors, and field oversight personnel
Weekly Safety Meeting	Incidents, modifications to APP, upcoming work, new hazards, etc.	SSHO, Site Superintendent	Weekly	All field workers, supervisors, and field oversight personnel

Notes:

AHAs = Activity Hazard Analyses
 APP = CPR = Cardiopulmonary Resuscitation
 HAZWOPER = Hazardous Waste Operations and Emergency Response
 HTRW = Hazardous, Toxic, and Radioactive Waste

LOTO = Lock-out/Tag-out
 OSHA = Occupational Safety and Health Administration
 PPE = Personal Protective Equipment
 SSHP = Site Safety and Health Plan
 SSHO = Site Safety and Health Officer



5.2 Periodic Safety and Health Training for Supervisors and Employees

All project personnel will participate in training/refreshers throughout the project. These topics may be presented as a part of the daily tailgate meetings, or as separate classes established for specific project work activities and procedures. All supervisors, managers, and employees are encouraged to participate in other seminars or courses provided by outside vendors as necessary to increase knowledge and to maintain currency with construction topics, hazards, and controls.

5.3 PPE and Safety Equipment Training

5.3.1 Training Certification

- Workers will be trained in and be able to demonstrate their understanding of PPE use prior to use regarding the selection, donning, doffing and adjustment, limitations and useful life, inspection and testing, proper care including maintenance, storage and disposal. Employee will be donning and doffing PPE in the Contamination Reduction Zone. They will proceed through the EZ, CRZ and support zone.
- Retraining of workers shall be conducted whenever it is believed that the worker does not have the understanding or skill required for the use of the PPE.
- Written certification shall be maintained in the Project Safety Office that each affected worker has received and understood the required training.
- Each training certification will list the name of the attendee, dates of the training, and the course title.

5.4 Site Orientation

All personnel, including subcontractors, assigned to the project will be required to go through an initial site safety orientation prior to the start of field work. Orientation will include review of the APP and applicable AHA's. Site orientations will be conducted in a manner using translators and diagrams as needed to ensure all workers understand the site rules, goals, and requirements.

5.5 Visitor Indoctrination Policy

All site visitors will be required to review the daily tailgate safety issues and sign in/out on the visitor's accountability log. At a minimum, all visitors must be informed of the anticipated hazards, PPE requirements, designated work zones, escort procedures, and emergency procedures.



This page intentionally left blank.



6.0 SAFETY AND HEALTH INSPECTIONS

EFS and its subcontractors will perform periodic health and safety inspections throughout the duration of the Project. Results of all health and safety compliance review audits or inspections will become part of the project file.

6.1 General Inspection Procedures

Table 6-1 lists the general inspection requirements for this Project. Findings that represent deficiencies in the implementation of the APP or EM 385-1-1 and cannot be corrected immediately, will be added to the Tracking Log, which will be posted in the administrative area and updated on a daily basis.

Additional specific inspection requirements may be necessary and will be included in the AHA, site SOPs, or O&M procedures, where applicable.

Table 6-1 General Inspection Requirements

What	Who	When	Documentation
General site conditions	SSHO	Daily	ECC proprietary Safety App. All results are kept in a database and can be printed out/delivered as requested.
	Supervisor/QC	Bi-Weekly	Site Health and Safety Inspection Checklist and Action Item Report, cc: SSHO, Program Manager, Program/Project ESQ Manager
	Project Manager	Monthly	
	Program/Project Health and Safety Officer	Quarterly	
Mobile construction equipment	Operators	Initial and Daily	Inspection checklist, Construction/Equipment Supervisor
Construction tools and equipment	Users	Daily	Equipment inspection form; other tools as required by manufacturer or regulation. Tag defective items “out of service”
Excavations	Competent person	Daily	If greater than four feet deep, use ECC Daily Competent Person Inspection form. If less than four feet deep, use the logbook.
Rigging	Competent person	Daily	Visual inspection prior to use; documented annual inspection; Rigging items must be tagged with ID/ load capacities.
Ladders	SSHO	Weekly	Logbook, tag or inspection log form
Emergency supplies and equipment (fire extinguishers, spill response, first aid, etc.)	SSHO	Weekly	Logbook, tag or inspection log form
PPE	SSHO	Initial, Periodic	Document in daily inspection notes, when conducted
	Users	Daily	Daily visual/functional prior to use; Defective PPE tagged out of service or destroyed and disposed.
Hazardous energy sources and processes (electrical systems, pneumatic equipment, etc.)	Competent or Qualified person	Initial	Per operating instructions, QCP, O&M procedures
	User/Operator	Daily	SOP For LOTO, ECC SOP .04-03 is included in Appendix B
	Authorized personnel	Before and after work	Permit or lockout log.



		under LOTO procedure	
Confined Space Entry	Attendant/Supervisor	Before and during confined space activity	Permit

6.2 External Inspections and Certifications

If regulatory agency personnel arrive on site to conduct an inspection, the EFS PM / PM Team Lead and the following individuals will be contacted immediately:

- Contracting Officer's Representative;
- Subcontractor's site representative
- EFS SHM;
- EFS Program Manager;

If a citation is issued to EFS or its subcontractors, a copy of the citation will be submitted to the USACE Representative along with a Corrective Action Plan.

6.3 Follow-up Procedures for Deficiencies

All deficiencies identified during project or equipment inspections are noted and tracked through closure. Deficiencies identified by operators during equipment inspections are noted on the equipment inspection form. Any deficiency noted must be reviewed by the superintendent or foreman prior to the equipment being allowed to operate. Any deficiency that affects safe work performance must be corrected before the equipment is put back into operation. Minor deficiencies that do not affect safe performance will be corrected as soon as practical. Following correction of the deficiency, the noted item is initialed by the superintendent or SSHO on the inspection form as corrected.

Deficiencies identified during the bi-weekly formal site inspections are noted on the inspection form (with a due date and responsible individual) as well as on the Safety and Occupational Health Deficiency Tracking Log. These deficiencies are also tracked to closure and verified upon completion. Deficiencies corrected immediately will be noted on the weekly inspection form.

Following the occurrence of a High Potential for Loss incident, specific corrective actions are entered into ECC's intranet site (ECCONET) with due dates, corrective actions and responsible individuals. These reports are reviewed by senior EFS Health and Safety personnel for adequacy of the investigation, corrective actions and timeliness of corrective action implementation.



7.0 INCIDENT REPORTING AND INVESTIGATION

This section describes the project incident reporting and investigation procedures. Other USACE procedures may be utilized if there is a significant safety issue that occurs during the project.

7.1 Incident Summary

The SSHO will provide an incident summary to USACE upon request. The summary will include a list of incidents meeting the definition in Section 7.2.

Incident Investigation, Reporting and Logs

All incidents are reported immediately to the Supervisor. Incidents will include:

- OSHA-recordable injuries or illnesses (e.g., medical treatment beyond first aid);
- Injuries to authorized visitors or the general public;
- Fires and explosions of any magnitude;
- Spills and environmental releases;
- Tool or equipment failure which results (or could result in) serious injury;
- Property damage, equipment damage, or environmental damage resulting in a loss of more than \$500 (If \$2,000 or more it will be reported to the client); and
- Any event which, under slightly different circumstances, could have resulted in one of the above. (High Potential for Loss Incident/Near Miss)

All injuries, illnesses, and property damage accidents will be reported to the Contracting Officer/Contracting Officer's Representative as soon as possible, but no later than 4 hours after the incident. Investigation findings and corrective actions will be reported as soon as possible following an accident.

The supervisor, with the assistance of the SSHO, will investigate the incident and complete all necessary incident reports and logs, including the EFS Incident Report and USACE Mishap Investigation and Notification ENG Form 3394, or regulatory agency reports. Incident reports are required to be prepared and submitted for incidents involving recordable injuries and illnesses, property damage, and other incidents meeting the definition of "mishap" as per EM 385-1-1. These may also be submitted by an electronic system if required and specified by USACE.

All incidents, regardless of severity, require some type of investigation and corrective action. Immediate and basic causes will be identified, evaluated, and used to support the recommended corrective actions.

A project-specific OSHA 300 Log (Log of Work-Related Injuries and Illnesses) will be kept at the job site. Minor injuries requiring only first aid will be recorded on a project - specific First Aid Log. From 1 February through 30 April of each year, OSHA Form 300A (Summary of Work-Related Injuries and Illnesses) will be posted on the project safety and health bulletin board.



7.2 Immediate Notification of Major Accidents

The USACE representative and/or Government Designated Authority (GDA) will be verbally notified immediately of any incidents that involve, or appear to involve:

- A fatal injury;
- A permanent total disability;
- A permanent partial disability;
- Loss of an eye;
- Amputation;
- The hospitalization of an employee resulting from a single occurrence;
- Property damage of \$200,000 or more;
- An arc-flash incident/accident;
- A weight-handling mishap;
- A High Visibility Accident (may generate publicity or high visibility); or
- Three or more individuals become ill or have a medical condition which is expected to be related to a site condition, or a hazardous or toxic agent.

The Project Manager/Project Manager Team Lead will contact the SHM, immediately if a major incident occurs.

At the time of any major incident, project site conditions will be secured and preserved until released by the Government investigation team.

The written report will be submitted to the USACE Representative or GDA, on the appropriate ENG 3394, or other system, as directed, no later than five working days after the accident. Corrective actions will be implemented as soon as possible.



8.0 PLANS, PROGRAMS, AND PROCEDURES

The following sections address the plans required by the USACE in the Safety and Health Requirements Manual (2014).

8.1 Fatigue Management Plan

Employees will be trained on the contents and requirements of this plan, during initial site orientation, as part of the APP review. Signing the APP acknowledgement will be considered acknowledgment of training on this plan.

Fatigue is defined as extreme tiredness, typically resulting from mental or physical exertion or illness.

Impact of Fatigue

Fatigue affects an employee's ability to think clearly and act appropriately. Additionally, employees are less alert, decline in performance, are less productive, and are more likely to have accidents and injuries.

Employees affected by fatigue are unable to recognize their own level of impairment and are unlikely to be aware of their performance issues. In some cases, employees can fall asleep in the middle of a task.

Causes of Fatigue

Fatigue may be caused by factors including:

- working excessive hours, increased workload, unplanned work, pressure to complete tasks, stress, commuting times
- amount of concentration required and complex or difficult tasks
- physically demanding or repetitive tasks
- changes in daylight hours or switching to/from day shift to night shift, adversely impacting circadian rhythm
- quality of sleep, sleep/rest cycles, quality of rest, and hours of sleep
- health conditions and medications

Effects of Fatigue

Fatigue can have many adverse effects on employees, including serious physiological conditions. Employees experiencing fatigue may exhibit the following symptoms or conditions:

- irritability, difficulty concentrating, memory lapses or loss, impaired moral judgement, decreased reaction time and accuracy
- severe yawning, tremors, body aches, difficulty breathing, digestive problems, hallucinations
- impaired immune system, risk of diabetes, increased heart rate, risk of heart disease, obesity, depression



Preventing Fatigue

What employees can do to prevent fatigue:

- Get adequate sleep. All age ranges need between 7-9 hours of quality sleep. Sleep in a quiet, comfortable and dark room
- Avoid excessive consumption of alcohol
- Avoid food and beverages containing caffeine or other stimulants before bed.
- Maintain a basic level of fitness and exercise regularly
- Maintain a healthy diet

Site controls to prevent fatigue:

The following workday-duration limitations will be in effect for work at the site:

- When job conditions require more than 12 consecutive hours of work, the SSHO will ensure that no employee works more than 16 consecutive hours. When an employee has worked a 16-hour shift, that employee will be given a minimum of 8 hours of designated rest before returning to work. Approval to work greater than a 72-hour workweek must be granted by the Program Manager and Health and Safety Manager.
- No employee will be assigned to work more than 12 consecutive days without 1 day of designated rest. Employees who have completed 12 consecutive days of work may volunteer for additional consecutive days of work. However, no employee will work more than 14 consecutive days without 1 day of designated rest. Approval to work greater than 14 consecutive days without 1 day of designated rest must be granted by the Program Manager and Health and Safety Manager.
- Personnel working on projects, including those who are operating hoisting equipment, mobile construction equipment, or hydraulically operated equipment, may work up to 12 hours at the site, which includes travel time to housing. This workday duration is subject to reduction.
- Personnel will not operate motor vehicles after being in a duty status (regardless of their role or function) for more than 12 hours during a 24-hour period without at least 8 consecutive hours of rest. A minimum of 8 consecutive hours will be provided for rest in each 24-hour period.
- No employee may drive continuously for more than 10 hours in a single, on-duty period (or 24-hour period without at least 8 consecutive hours of rest).

The Site Superintendent/SSHO is responsible for adjusting the workday duration within the limits set above. The following factors will be considered for adjusting the workday duration:

- Time of year (e.g., reduce the workday duration because there is less daylight in winter)
- Temperature/weather (e.g., reduce workday duration when the temperature is very hot or very windy)
- Type of work (e.g., reduce workday duration for personnel involved in physically demanding phases of work).



If an employee observes a co-worker exhibiting signs of possible fatigue, the employee will take action to make sure the co-worker is out of immediate danger and then contact the supervisor for further intervention.

Supervisors will evaluate each employee's condition, engaging health and safety personnel as well as the Project Manager, when necessary, to determine if an employee needs additional rest or if the employee should be removed from the work area to prevent harm to herself/himself or others.

If an employee is determined to be experiencing excessive fatigue that places he/she at risk, arrangements will be made to make sure the employee obtains adequate rest/sleep.

8.2 Emergency Response Plan

8.2.1 Emergency Contact List

The Emergency Contact List for this project is included in **Appendix E**. It will be made available to all site personnel and posted in work areas. It will be updated as required.

Coordination with Local Emergency Agencies

Local authorities and emergency services will be contacted prior to initiation of work and all emergency numbers verified. Additionally, EFS will request an on-site meeting, to discuss emergency procedures, meeting points, and allow the providers to become familiar with the site. The work objectives and on-site capabilities will be explained, as well as the most likely emergencies. Preferred contact procedures will be established, and the response capabilities of local responders will be determined. EFS will ensure there is good coordination between our emergency plan and local requirements. The SSHO will document this meeting in the project files.

Personnel Roles and Lines of Authority

During all emergencies, the Superintendent will serve as the Emergency Coordinator and the SSHO will support the Emergency Coordinator in the safety officer role. Together they will abate and/or contain the emergency.

Emergency Recognition and Prevention

Conditions that may lead to an emergency situation during field activities will be addressed in specific AHAs as tasks are identified. These conditions include:

- Incident involving a serious injury
- Medical or Health Condition
- Fire
- Environmental release
- Severe weather

Before daily work assignments, regular "tailgate/toolbox" safety meetings should be held. Discussions should include, but not limited to:



- Specific task to be performed (Plan of the Day)
- Weather conditions
- Time Constraints (e.g. rest breaks, extended operations)
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals
- Near misses from the previous day's work
- Emergency Procedures

Safe Distances and Safe Zones

The Emergency Action Procedures indicate places of refuge for severe weather events. All site personnel will shelter in place in the support zone facilities during any severe weather event. They also include the general evacuation plan and rally points.

For releases of hazardous material, the SSHO will monitor the rally point to ensure exposure to hazardous materials is not likely to occur. The evacuation routes and rally points during a fire or environmental release may be modified during the response due to wind direction and potential exposure situations. Personnel must remain alert for changes to alternate routes and rally locations.

Site Security and Control

Site control procedures will include the establishment of Work Zones in order to provide site security by avoiding unauthorized access and to secure work locations between shifts. On this project, work zones may be established by using appropriate work area signage in combination with high visibility construction fencing, warning or danger tape, barricades, or other measures.

The SSHO, as well as all employees, will stay alert for any unauthorized entry and take necessary actions to control the work area.

Authorized site visitors may visit the site upon meeting the following conditions:

- Receiving site hazard and safety instructions from the Site Safety and Health Supervisor; to include Emergency Response. procedures briefing
- Reviewing and complying with the essential elements of the APP
- Using their own, or provided PPE, to enter regulated work areas per the APP
- Reporting any observed unsafe act and/or condition at, or affecting, the work site

Visitors will be evacuated from the incident location, or from the site, during emergency activities.

Evacuation Routes and Procedures

Evacuation Routes and rally points are presented in **Figure 2-3** and will be finalized upon mobilization and posted on the site.



Decontamination Procedures (HTRW Projects)

In the event an employee comes into contact with chemical contamination, the material will be removed to the extent possible. The SDS for the material will be carried to the hospital and the hospital will be notified en-route, of the nature of the contamination, so the employee can be appropriately treated.

Emergency Medical Treatment (First Aid AID/ CPR)

At least two employees certified in both First Aid and CPR use be on the project at all times. First Aid kits will be maintained on site. The type of kit utilized will be determined by their storage location and will conform to ANSI/ISEA Z308.1 (EM 385-1-1 section 03.B.01). The contents of each kit filled with the minimum contents listed in EM 385-1-1 section 03.B Table 3-1. The kit(s) will be checked prior to being placed in use, and weekly thereafter (EM 385-1-1 section 03.B.02). First Aid emblem should also be attached to the field trailer(s) containing First Aid kits, next to all doors. A log of First Aid treatment and materials used will be kept on or adjacent to the First Aid kit. If an injury or illness requires more than first aid but is not an emergency, the employee will be taken to the designated local “Urgent Care” facility for examination or observation, after contacting the EFS Corporate Medical Provider, WorkCare, at 800-455-6155.

If the injury or illness is considered an emergency, the local response team will be contacted to transport the victim to the local hospital or emergency care facility.

Rescue Operations

Where employees are engaged in one of the following activities or environments, a rescue plan will be incorporated into the AHA or appropriate site-specific plan:

- Working at elevations
- Using personal fall arrest systems
- Confined spaces, or potentially immediately dangerous to life and health atmospheres
- Working alone
- Working in remote environments
- Work conducted on or over water

Emergency Alerting and Response Notification

An employee alarm system will consist of the use of air horns, equipment horns, or verbal instructions, either directly or via radio.

Air horn signals include the following:

Series of short blasts – Shut down equipment, await instructions, First Aid trained personnel should proceed to the location of the alert.

- Use radios to alert site personnel



Telephones will be used to contact off-site emergency responders. Emergency numbers will be posted in the site offices, and a copy will be kept in site vehicles. The following information will be communicated:

- Name of the person reporting the emergency
- Telephone number at the location of the person making the call
- Name of the injured person, if known
- Description of the emergency
- Exact location of the emergency
- Actions already taken
- What assistance is needed

Employees working alone in remote areas will have either 2-way radios or cell phones. Employees will be required to check in hourly with the SSHO.

Personal Protective Equipment and Emergency Equipment

Each field team will have quick access to a First Aid kit, fire extinguisher, air horn and communications equipment. Additional emergency response equipment will be located at the field office.

Personal Protective Equipment (PPE)

PPE stored for medical emergency use include:

- Bloodborne pathogens kit

Emergency Supplies

At a minimum, the following emergency supplies will be immediately available for on-site use:

Item	Qty	Locations
Air horns (or other designated signaling method)	1	Work area
First Aid kit	2	Office Location/Work area
		Main Office
Emergency eyewash station as per ANSI Z-358.1 (if exposure to corrosive materials is present)	1	Work area adjacent to corrosive chemicals
Bloodborne Pathogen PP;	2	Office/Work Area
Spill control material and equipment		Adjacent to fuel areas
Radio and cell phone;		Carried by all personnel
Type ABC fire extinguisher		In office, adjacent to fuel areas, in equipment hot work areas
A vehicle parked at an exit point	1	Office location



Reporting Procedures

All emergencies will be immediately communicated to the site superintendent and SSHO who will initiate emergency response procedures and notify the Contracting Officer's Representative and appropriate response personnel.

After the response, EFS will prepare an Incident Report. It will include such things as a chronological history of the emergency facts, actions taken, personnel present, sample results (if taken), summary of injuries and possible exposures. For spills and releases it will also include:

- Description of material spilled, including identity, quantity, and a copy of the Safety Data Sheet (SDS) or waste disposal manifest
- Exact time and location of the spill, and the description of the area involved
- Containment procedures utilized
- Description of the cleanup procedure employed at the site, including disposal of spill residue
- Summary of the communications EFS had with other agencies.

This report will be provided to the Contracting Officer's Representative within 24 hours of the incident along with immediate verbal notification.

The report will also contain a critique of the response and modifications to this plan will be made if necessary to adequately address subsequent emergencies.

Training

The Emergency Response Plan will be discussed during initial site training and discussed regularly during the Daily Tailgate Safety Meetings. The SSHO will conduct drills annually, or more frequently if conditions change, and evaluate the response testing the effectiveness of the plan. The local responders should be asked to participate or observe the response. A critique of the drill will be documented.

Any modifications to this plan as a result of a critique of a drill or actual emergency, will be communicated to all site personnel a tailgate safety meeting, and will be incorporated into the site orientation for new workers.

8.2.2 Injury and Medical Emergency

Prevention:

Wear proper PPE at all times. Implement precautions in the AHA. Follow standard operating procedures. Avoid pinch points, struck by hazards and exposures to falls from elevation. Report all hazards, injuries and illnesses to your supervisor immediately. Follow instructions on all prescription medications. Stay hydrated.



Recognition and Reporting:

If an injury, illness or medical condition arises, notify your nearest co-worker immediately. Have them call the SSHO or your supervisor.

All First Aid Providers will be contacted immediately and will report to location of the injured person. See Project contact list.

Actions:

1. First Aid Providers will do an immediate area and victim assessment in accordance with their training.
2. Call 911 (or local emergency notification number) immediately if any of the following situations exist:
 - a. Unconscious
 - b. Severe bleeding
 - c. Head or spine injury is suspected
 - d. Seizures
 - e. No pulse
 - f. No breathing
 - g. Overdose situation possible
 - h. Situation requires rescue/medical evacuation (fire, airborne release, workplace violence, trapped)
 - i. Any other situation where the condition of the patient is in question. If in doubt, contact 911.
3. Establish clear area or have ambulatory patient move to a safe location.
4. Apply Universal Precautions per Bloodborne Pathogens Exposure Control Plan and training, and don PPE (disposable gloves, CPR mask, etc.).
5. Provide appropriate First Aid/CPR consistent with training and certification.
6. Provide complete information to emergency medical technicians, if necessary.
7. Clean area and contain potentially contaminated materials and articles in labeled bag per Bloodborne Pathogens Exposure Control Plan.
8. Participate in incident investigation, provide for and monitor medical follow up if necessary.

8.2.3 Fire

Recognition and Reporting:

Call 911 or other designated number in the event of observation of any uncontrolled fire or smoke.

Actions:

1. Always alert the emergency management system first, regardless of the size of the fire.
2. Use fire extinguisher if:
 - a. You have been trained



- b. You have an escape route behind you
 - c. The fire is small (incipient stage) and can likely be put out with one extinguisher in about 10 seconds
3. If the fire cannot be controlled with a fire extinguisher:
 - a. Notify Supervisor or SSHO and initiate evacuation procedure immediately.
 - b. The Emergency Coordinator will notify site personnel and client representatives of evacuation order and coordinate with the Incident Commander.
 - c. The SSHO will ensure evacuation alarms are sounded, and evacuation proceeds in accordance with Evacuation Plan.
4. If the fire is controlled by a fire extinguisher:
 - a. Call for another fire extinguisher for stand by
 - b. Remove potential sources of fuel and ignition
 - c. Stay at the location until relieved by the Emergency Coordinator or Fire Department to watch for re-ignition
5. Participate in incident investigation.

8.2.4 Evacuation

Prevention:

Most emergency evacuations can be prevented by following the APP and by practicing safe behaviors. Report all hazards and suspicious activities immediately.

Recognition and Reporting:

Emergency evacuation of the site may be prompted by various situations, including but not limited to the following:

- Fires
- Hazardous material releases
- Sudden severe weather events
- Workplace violence or terrorism
- Utility damage
- Off-site emergency that may impact site operations

Report potential emergency conditions immediately to your supervisor or the SSHO. Call 911 or the installation Emergency Management System number. See Project Contact list.

Actions:

1. In the event of an emergency, the Emergency Coordinator or SSHO may initiate evacuation of the site by sounding the evacuation alert - one long blast on the air horn or equipment horn.
2. Call 911 (or local emergency notification number or radio channel).
3. The Emergency Coordinator will notify and coordinate with client representatives, installation personnel and emergency responders.



4. Upon arrival of emergency response personnel, the Emergency Coordinator will report to and assist the Incident Commander.
5. The SSHO will retrieve the daily sign in logs and proceed to the rally point.
6. All personnel, upon hearing the evacuation alert, or receiving verbal instructions to evacuate will immediately proceed along the designated route to the rally point, located at: (post map upon mobilization).
7. In the event of a fire or release of airborne toxic chemical, check local wind indicators. Evacuate in a direction perpendicular to the wind direction if possible.
8. Be attentive for instructions on changes in rally location based on site conditions.
9. In some cases, a shelter-in-place order may be given. In that case, close doors and windows and shut off ventilation system.
10. Report to your Supervisor at the rally point.
11. Supervisors will report on the presence of crew members to SSHO for accountability purposes.
12. Look around for friends and co-workers. Report anyone missing to the SSHO or Emergency Coordinator.
13. Critical plant operations – there are no critical plant operations on this project. Upon hearing the evacuation alert, all personnel will shut off power tools and equipment and proceed immediately to the rally point.
14. Rescue procedures are included in the Fall Protection Plan or Confined Space Entry Plan, if applicable. Once an evacuation order is given, rescue activities will be turned over to off-site emergency responders.
15. Site First Aid Providers will render First Aid and support to injured personnel at the rally point. In an evacuation, the local Emergency Medical Service will be notified and will take charge of medical support.
16. The Emergency Coordinator will report the status of evacuated personnel to the Incident Commander, including the name, description and last known location of any un-accounted for individuals.
17. The site may be re-entered when the Incident Commander gives the “all clear” order. An incident investigation will begin immediately, led by the Emergency Coordinator and supported by the SSHO.

Evacuation Routes are to be provided upon mobilization to each location.

8.2.5 Spills and Releases of Hazardous Materials

Prevention:

Supervisors will review the hazards of chemicals with their work crews and SDS and labels will be maintained in accordance with the Hazard Communication Program.

- **Avoid mixing chemicals**, even common household products. Some combinations, such as ammonia and bleach, can create toxic gases. When in doubt, consult the SDS or the SSHO.



- **Always read and follow the directions** when using a new product. Some products should not be used in small, confined spaces to avoid inhaling dangerous vapors. Other products should not be used without gloves and eye protection to help prevent the chemical from touching your body.
- **Store chemical products properly.** Non-food products should be stored tightly closed in their original containers so you can always identify the contents of each container and how to properly use the product. Containers of flammable and combustible liquids will be stored in flammable liquid storage cabinets or removed from the site at the end of the day. Bulk storage of fuels or other hazardous materials will have secondary containment, and containment around transfer valves, spigots and hoses.
- **Report and clean up any spills immediately** with some rags, being careful to protect your eyes and skin.
- **Follow operating procedures.** Implement procedures designed to limit open containers, excess pressure, surface area of contaminated environmental media, drum and container handling, etc.
- **Implement the Storm Water Pollution Prevention Plan** if one is required on the site, or general good chemical handling practices to keep materials from flowing off-site with stormwater.

Recognition and Reporting:

Notify your Supervisor or the SSHO of any spill or airborne release of hazardous materials. The SSHO and Emergency Coordinator will investigate and determine if an emergency should be declared and will issue an alert to evacuate or shelter-in-place if necessary. The Emergency Coordinator will Call 911 (or local emergency management system) if an emergency is declared. Any other agencies as required by local regulations will also be notified.

The Emergency Coordinator will notify the client representative immediately of any spill or release. Where reporting to installation and regulatory agencies is required, the reporting will be done in accordance with the communications plan approved by the Contracting Officer. See Project Contact List.

Actions:

The actions to be taken will depend on the nature and extent of the release. Only personnel trained in the procedures and PPE required to handle the spill or release should be involved in containing, stabilizing, and cleaning up the material.

1. If a release from an on-site or off-site source results in a shelter-in-place order:
 - a. Proceed to the nearest designated shelter
 - b. Shut doors and windows
 - c. Turn off ventilation system.
 - d. If possible, seal gaps around doors and window with tape, wet towels or other items
2. Take immediate measures to control and contain the release (e.g. shut off pumps, close valves).
3. Contact local emergency service providers.



4. Don protective equipment as specified by the SSHO.
5. If exposure to individuals causes injury/health effects, make sure the area is safe before attempting rescue or First Aid. If safe to do so, move them to fresh air and apply appropriate First Aid. Notify the Emergency Medical Service of the nature of injury.
6. Isolate and contain hazardous release areas.
7. Deny entry to the spill area to unauthorized personnel.
8. Do not allow anyone to touch spilled material.
9. Stay upwind, keep out of low areas.
10. Keep combustible materials away from the spilled material.
11. Use water spray or foam to reduce dust or vapors as needed.
12. Collect samples for analysis to determine that cleanup is adequate.
13. If the release is from tanks, prevent the discharge from traveling beyond site boundaries.
14. Containerize materials and arrange for proper disposal.
15. Take caution when handling drums (PPE) and containers (opening, sampling and over packing).

8.3 Plan for Prevention of Alcohol and Drug Abuse

The purpose of this Standard Operating Procedure (SOP) is to a) meet the requirements of applicable laws and regulations to ensure that the workplace is free of illegal drugs; b) establish restrictions on the workplace-related use of legal substances, such as alcohol and prescription drugs; c) address other behaviors and practices that can be related to the abuse of drugs and other substances; and d) enable EFS to comply with client Drug Free Workplace policies.

Scope and Application

This SOP includes requirements for the control of the use of alcohol, illegal drugs and legally prescribed drugs that may impact an employee's ability to work safely. This SOP applies to all EFS employees, as well as to all subcontractors who work on EFS project sites. For the purposes of this procedure, the term "employee" includes subcontractor employees.

Drug Free Workplace Policy

EFS prohibits the use, sale, dispersal, possession, or manufacture of illegal drugs, narcotics or alcoholic beverages on its premises. This prohibition also covers all legal or prescription drugs that impair an employee's ability to perform his/her job safely or properly. Employees will be subjected to disciplinary action, up to and including dismissal, for bringing illegal, non-prescribed drugs and narcotics or alcoholic beverages to work; being under the influence of such substances while working; using such substances while working; or dispensing, distributing, or illegally manufacturing or selling such substances on EFS premises or work sites.

Employees, their possessions, and EFS issued equipment and containers under their control are subject to search and surveillance at all times while on EFS premises or while conducting EFS business.



Employees may be required to take a test at any time to determine the presence of drugs, narcotics, or alcohol, unless such tests are prohibited by law. Employees convicted of any criminal drug violation occurring in the workplace must report such conviction to Human Resources within five days, who will then take appropriate actions as required by law.

Employees judged to be under the influence of drugs, narcotics, or alcohol will be required to leave the premises. Employees who must use prescribed drugs or narcotics during work should report this fact to their supervisor and provide acceptable medical documentation. A determination will then be made as to whether the employee should be able to perform his/her job safely and properly.

Employees experiencing problems resulting from drug, narcotic, or alcohol abuse or dependency are encouraged to seek rehabilitation, counseling, and/or other help.

Drug and Alcohol Testing

For the purposes of this SOP, the terms "drug screening" or "drug testing" includes testing for alcohol, in either blood, urine, or breath.

Pre-employment Drug Screening

Pre-employment drug screening shall be required for all EFS full-time and project employees. EFS shall test for the following drugs: ethanol (alcohol), amphetamines, barbiturates, benzodiazepines, cocaine metabolites, methadone, opiates, phencyclidine, and marijuana metabolites. The list and cutoffs may be modified by the Corporate Medical Consultant, who also serves as the Medical Review Officer, in accordance with rules and guidelines established by the Substance Abuse and Mental Health Services Administration (SAMHSA). This testing may also be required before a new assignment, such as a promotion or assignment to a particular job site. All positive tests results are kept confidential at all times by the Human Resource Department.

Subcontractors must provide a statement or certification that their employees have had pre-employment screening with negative results.

Periodic Drug Screening

Annual or biennial drug screening shall be required for all operational department personnel conducting work activities at EFS project sites. Periodic drug tests will measure the same substances as the pre-employment tests. All positive results are kept confidential at all times by the Human Resource Department.

Post-Accident Testing

Employees who are involved in an incident that results in an employee injury requiring medical treatment beyond First Aid, equipment, or property damage above \$500, a serious environmental release, or who have been observed committing a substandard practice that could result in the above, will be required to submit to drug and alcohol testing as soon as possible. Operators of vehicles or construction equipment involved in a collision with a person or another object or



contact with overhead power lines are included in this testing requirement.

Test Sample Validity

Employees will be retested if the test results are deemed invalid or too dilute to detect levels at or below the cutoff values. Evidence of sample tampering will be grounds for immediate discharge or revocation of offers of employment.

Refusal of Testing

Refusals to submit valid samples for testing in accordance with this SOP will be treated as positive results.

Monitoring

Monitoring conformance with this SOP will be the responsibility of the Human Resources Department, with the assistance of Environment, Safety and Quality and the Medical Review Officer.

Training

Employees will be trained on this SOP during their new-hire orientation. Subcontractor employees will be trained on the SOP during site-orientation.

Documentation

EFS employees will be required to pass a quiz after reviewing a power point presentation on their Training Matrix.

Project employees including site subcontractors will sign an Orientation sign-in sheet which will be maintained in the site files.

8.4 Site Sanitation Plan

This Plan is applicable to work being performed by EFS, their subcontractors and their employees.

Housekeeping

The site and office areas will be kept as clean as possible, taking into consideration the nature of the work. Regular cleaning shall be conducted to ensure safe and sanitary conditions in the workplace.

Waste materials will be properly disposed of, and routinely removed from the site.

Vegetation will not be allowed to grow around storage and dispensing containers containing flammable liquids and gases.

Drinking Water

An adequate supply of potable water (cool drinking water when weather is hot) shall be provided for both drinking and personal cleansing. Bottled water is acceptable. Empty bottles will be



deposited into a designated recycling (or trash if recycling is not available) receptacle immediately to maintain good housekeeping.

Non-Potable Water

Outlets dispensing non-potable water shall be conspicuously posted “**CAUTION – WATER UNSAFE FOR DRINKING, WASHING OR COOKING**”. There shall not be any cross connection, open or potential, between a system furnishing potable water and a system furnishing non-potable water.

Non-potable water may be used for dust control and for cleaning work areas, except for food prep areas and personal service rooms, provided this non-potable water does not contain concentrations of chemicals, fecal coliform, or other substances which could create unsanitary conditions or be harmful to employees.

Toilets

The project site will have sufficient toilet facilities for each sex in accordance with the **Table 8-1** below:

Table 8-1 – Minimum Toilet Facilities

Number of Employees	Minimum Number of Toilets ¹
20 or fewer	One (1)
20 or greater	One (1) toilet seat and One (1) urinal per 40 workers
200 or greater	One (1) toilet seat and One (1) urinal per 50 workers

NOTE: ¹Where toilet facilities will not be used by women, urinals may be provided instead of commodes, except that the number of commodes in such cases shall not be reduced to fewer than 2/3 of the minimum number specified.

All shall be provided with adequate light and ventilation. Toilet paper shall be provided and when water is not present, hand sanitizer. Facilities shall be constructed so that occupants are protected against the weather and falling objects; all cracks shall be sealed and the door self-closing, tight fitting and capable of being latched.

Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and the placement location selected shall be in accordance with Federal, state and local regulations.

The toilet facilities will be kept clean and orderly in between servicing. Graffiti on toilet facilities is forbidden.



Washing Facilities

Washing facilities shall be provided at toilet facilities and as needed to maintain healthful and sanitary conditions. If it is not practical to provide running water and soap, hand sanitizers may be used as a substitute.

Waste Disposal

An adequate number of waste receptacles shall be provided in break and food service areas, these receptacles shall be constructed to prevent leakage, allow for cleaning, have tight fitting lids and be emptied daily.

All sweepings, solid or liquid wastes, refuse and garbage shall be removed in a manner which avoids creating a menace to health and should be emptied as often as necessary or appropriate to maintain sanitary conditions at the workplace. (Roll-off or dumpster)

Vermin Control

Every enclosed workplace shall be constructed, equipped, and maintained, as practicable as possible, in order to prevent the entrance or harborage of rodents, insects, or other vermin. In the event of a hazardous presence or infestation occurs on site, licensed pest control services will be employed.

8.5 Medical Support Agreement

This plan provides information for medical support for all operations at the project identified above.

Communication

The site will have ready communications to medical support facilities via cell phone. Phone numbers are listed on the Emergency Contact List (Appendix E- Emergency Contact List) posted on the Safety Bulletin Board, site office or kept in the SSHO site vehicle.

First Aid and Medical Facilities

Hospital and Clinic information for this project is included in **Appendix E** – Emergency Contact List.

Minor injuries will be treated on-site by certified First Aid Providers. If additional care is needed, the local non-emergency “urgent care” clinic.

If an incident results in a major injury, call 911 or local number for ambulance. EFS will not transport non-ambulatory, unconscious or shock risk patients. The designated hospital may be used for more minor injuries during off-hours when the local clinic is closed. Copies of these route maps will be kept in all site vehicles.



Medical consultation can be obtained from ECC's occupational medical consultant WorkCare, Inc, for ECC employees only. WorkCare should be called before transporting any minor injury to the local clinic or emergency room.

At least one First Aid kit for every 25 employees will be kept on site. The First Aid kits will comply with American National Standards Institute Z308.1. All kits will contain bloodborne pathogen prevention personal protective equipment including surgical gloves and resuscitator mask or shield.

At least two individuals with current certification in First Aid and CPR will be available on each shift.

Each will have current certification in First Aid and CPR from the American Red Cross, the American Heart Association, or from an organization whose training adheres to the standards of the International Liaison Committee on Resuscitation (as stated in writing), or from a Licensed Physician. Certification courses will have hands-on component that cannot be taken on-line. Retraining will occur every 2 years.

First Aid Providers on this project include:

Name	Training Expiration Date
Yong McGuire	03/27/2026
Greg Hayes	02/4/2025

The above noted Project employees are First Aid and CPR trained, are qualified to administer First Aid and CPR and have completed Bloodborne Pathogen training in accordance with 29 CFR 1910.1030. Their duties are to provide First Aid/CPR in accordance with their training.

8.6 Bloodborne Pathogen Program with Exposure Control Plan

Scope and Application

This Plan applies to EFS and subcontractor employees who may be exposed to another individual's blood or other bodily fluids during the course of the project identified above. Specifically, this includes individuals who have current First Aid training and may provide First Aid on the job [e.g., project SSHOs, as these are the only project members who may have exposure to bloodborne pathogens (BBP) and providing First Aid is the only activity where such exposure is anticipated. It includes the site-specific Exposure Control Plan for the project. For the purposes of this Plan, First Aid refers to administration of cardiopulmonary resuscitation (CPR) as well as other common First Aid procedures.



Exposure Control Plan

Definitions:

Bloodborne Pathogens (BBP) means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, Hepatitis B virus (HBV) and Human Immunodeficiency Virus (HIV).

Occupational Exposure means reasonably anticipated skin, eye, mucous membrane, or other non-oral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Personal Protective Equipment is specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts, or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

Universal Precautions is an approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HBV, HIV, and other BBP.

Exposure Determination

Job Classifications in which All Employees have Occupational Exposure:

- EFS has no job classifications in which all employees have occupational exposure.

Job Classifications in which Some Employees have Occupational Exposure:

- The potential for occupational exposure exists for individuals who have current First Aid training and may provide First Aid on the job, including project SSHOs and designated First Aid Providers for this project.

Hepatitis B Vaccination

A Hepatitis B vaccination will be made available at no charge to First Aid Providers immediately following an occupational exposure, unless the employee has previously received the complete Hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons. If an employee desires a Hepatitis B vaccination after the initial BBP training, but prior to an occupational exposure, they should contact the Project Safety and Health Manager (SHM).

Exposure Prevention

Engineering Controls - The only foreseeable exposure potential on this project is through application of First Aid, which requires direct contact with the injured party. Engineering controls are not feasible for this activity.



Administrative Controls – Only personnel trained in FA/CPR and Universal Precautions will attend to individuals injured or ill on the project. First Aid Providers will keep other personnel out of the immediate First Aid area where contact with bodily fluids may occur by the use of caution tape barricades or posting a spotter to keep other employees away. Spilled bodily fluids will be demarcated and barricaded with caution tape until the First Aid Providers clean the area as described below.

Personal Protective Equipment (PPE) and Clean up Materials - This project will have available on site a bloodborne pathogen kit, with appropriate PPE. The kit includes but is not limited to:

- Gloves
- Eyewear (goggles or glasses)
- Face shields
- Resuscitation barrier
- Bleach and water (or 10% bleach solution in labeled container)
- Paper towels
- Disposal bag for contaminated materials

These materials will be maintained with the First Aid kit, in the site trailer, or if no trailer on site, in the SSHO's site vehicle.

Universal Precautions - Universal precautions include wearing gloves when contact with blood or other bodily fluids is possible and wearing eye protection. Face shields must be worn when there is danger of blood splashing on mucous membranes.

In providing First Aid, where exposure to bodily fluids is possible, the First Aid Provider shall:

- Try to isolate the area, and limit approach by other people
- Don protective gear including surgical gloves and eye protection and a face shield if splashing is possible
- Collect all wastes such as gauze pads, gloves and resuscitation barriers and place in a red bag (or other properly labeled container)
- Clean any spillage and disinfect potentially contaminated surfaces in accordance with Section 3.6 below, disposing of the cleaning materials also in red bag
- Carefully remove gloves inside-out, placing them in the disposal bag
- Call the SHM to report a potential exposure event

Post-Exposure Actions

Following an occupational exposure incident, the affected party shall **IMMEDIATELY** inform the SSHO or other management personnel, who in turn must **IMMEDIATELY NOTIFY THE SAFETY AND HEALTH MANAGER** by telephone. In no case shall the report be made later than the end of the work shift during which the incident occurred. Immediate notification is essential to allow proper consultation with the WorkCare Occupational Physician in order to



ensure that the proper post-exposure evaluation, prophylaxis (initiation of Hepatitis B vaccination), and follow-up procedures are made available immediately.

This notification must include:

- A description of the First Aid incident including time and date
- The potential routes of exposure
- The names of all First Aid Providers who rendered assistance
- Type of personal protective equipment used, or if none used
- The identity of the source individual where feasible

A confidential post-exposure medical evaluation and follow-up must be immediately made available to the employee after the report of an occupational exposure, along with the opportunity for Hepatitis B vaccination. The medical evaluation is offered at no cost to the employee.

If the Hepatitis B vaccination is provided, a copy of the employee's Hepatitis B vaccination status including the dates of all the Hepatitis B vaccinations and any other relevant medical record required by 29 CFR 1910.1030(f)(2) shall be forwarded to WorkCare for retention and maintenance in the employee's medical file.

If the employee declines to accept a recommended Hepatitis B vaccination following an occupational exposure, the employee shall complete and sign the Declination Form and return it to the SHM. The form can be obtained from the SHM. The SHM shall forward the form to Corporate Records Administrator for retention as an employee Medical Surveillance document.

Although the Bloodborne Pathogen standard excludes employees who perform unanticipated Good Samaritan acts from coverage (as this is does not constitute "occupational exposure"), EFS shall offer follow-up medical evaluations and Hepatitis B vaccinations to EFS employees who experience a work-related exposure incident as the result of performing a Good Samaritan act at work.

Decontamination, Sterilization, and Disposal

All surfaces that come in contact with blood or potentially infectious materials must be decontaminated as soon as possible. Decontamination should be accomplished by using a solution of household bleach (5.25% sodium hypochlorite) diluted about 1:10 with water.

When diluting bleach, always carefully add bleach to water to avoid a hazardous exothermic reaction. NEVER pour water directly into bleach.

When cleaning up a spill of blood, carefully cover the spill with paper towels or rags, and then gently pour the 10% solution of bleach over the towels or rags. This will decrease the chances of causing a splash when you pour the bleach on it. ***Leave it in place for at least 10 minutes.*** This will help ensure that the bloodborne pathogens are killed before beginning to clean or wipe up the material.



When decontaminating equipment or other objects (knives, tweezers, mechanical equipment upon which someone has been cut, First Aid boxes, etc.), leave the disinfectant in place for *at least 10 minutes* before continuing the cleaning process. Any materials used to clean up a spill must also be decontaminated or disposed immediately, including mops, sponges, buckets, towels, and rags.

Materials for disposal shall be placed in a strong, plastic garbage bag, sealed, and labeled. Contact your local health agency/hospital and waste company for additional information on appropriate or required disposal methods.

Training

Three elements are part of the required training: 1) First Aid / CPR, 2) Bloodborne Pathogens and 3) This Plan.

First Aid / CPR

SSHOs, as well as individuals designated as First Aid Providers (Yong McGuire and Greg Hayes), shall (at time of assignment) hold current certification in First Aid and CPR from the American Red Cross, National Safety Council, American Heart Association, or another qualified provider.

Bloodborne Pathogens

SSHOs, as well as individuals designated as First Aid Providers, shall (at time of assignment) hold current BBP training. When BBP training has not been received as part of an FA/CPR class, individuals must complete the on-line training.

BBP training is required at least annually thereafter.

ECC Bloodborne Pathogen Plan

The contents of this Plan will be reviewed with designated First Aid Providers by the SSHO at the initial assignment to the project. This training will be documented by having the First Aid Providers sign the plan review, below.

Documentation

Copies of all records and certificates related to completion of First Aid, CPR, and/or BBP training shall be submitted to the Contracting Officers' Representative and maintained on site for the duration of the project.

Bloodborne Pathogen Plan Review

A form to be used for documenting training will be printed out, signed by trainees, and kept on file at the site. Language on the form includes; *"I certify that I have been informed of the potential for exposure to bloodborne pathogens on this project, and this Bloodborne Pathogen Plan, including the Exposure Control Plan. I agree to use Universal Precautions in applying First Aid procedures. I also understand my rights to prophylactic or post-exposure Hepatitis B vaccination, and the availability of Medical consultation. I agree to immediately report any potential exposure to bloodborne pathogens that occur on this project site."*



8.7 Automatic External Defibrillator Program

Not applicable. An AED will not be utilized on this project.

8.8 Site Layout Plan

The Site Layout Plan is included as **Figure 2-3**. The plan is subject to change during the course of the project.

8.9 Access / Haul Road Plan

As part of this project, access roads will be constructed as required based on work area access. Roads will be constructed as per the details contained in the Site Operations Plan.

8.10 Hearing Conservation Program

Many noise sources will be present at the project site. Noise may be generated from the use of heavy equipment and tools, or from repair equipment that will be used. Hearing loss resulting from occupational exposure to noise can be prevented.

A hearing conservation program will be implemented whenever there is employee noise exposure equal to or exceeding an 8-hour TWA of 85 dBA. As part of the criteria for a hearing conservation program, audiometric testing of personnel will be conducted annually.

The CM/SSHO will conduct noise surveys as necessary to determine if engineering or administrative controls can be implemented and/or if hearing protection is required. If hearing protection is required, chosen devices will provide appropriate noise attenuation to acceptable levels.

Personnel will wear hearing protection when working with or around heavy equipment, power tools, as noise monitoring indicates, or in areas posted as such. Employees required to utilize hearing protection will be trained on the hazards of noise, protective measures, and proper fitting of the device.

If or when it is suspected that equipment is producing noise at sound pressure levels greater than 85 dBA, indicated by difficulty in communicating clearly at distances greater than 2 feet, or worker complaints, the CM/SSHO will conduct a noise survey with a sound level meter. Areas with fixed equipment, such as a generator, that are surveyed at sound pressure levels greater than 85 dBA will be posted as a noise hazard area. Actual employee exposures will then be determined with a noise dosimeter. The equipment/area will then be evaluated to determine if it is feasible to implement engineering controls.

Employees will be protected to ensure exposures do not exceed levels in **Table 8-2**.

Action Level

The 8-hour TWA of 85 dB or a dose of fifty percent is the action level for this project.



The exchange rate per the American Conference of Industrial Hygienists (ACGIH) is 3dB and will be observed.

Monitoring

When information indicates that any employee's exposure may equal or exceed an 8-hour TWA of 85 dB, EFS will implement a monitoring program.

Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, EFS shall use representative personal sampling to comply with the monitoring requirements of this paragraph, unless EFS can show that area sampling produces equivalent results.

Instruments used to measure employee noise exposure will be calibrated in accordance with manufacturer's recommendations. Monitoring will be repeated whenever there is a change in production, process, equipment, or controls, that increases noise.

Table 8-2
Permissible Noise Exposures (1)

Duration Per Day, Hours	Sound Level dBA Slow Response
8	85
4	88
2	91
1	94
0.5 = 30 minutes	97
0.25 = 15 minutes	100

dBA = Decibel Weighted Average

Footnote (1) when the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect will be considered. Exposure to different levels for various periods of time shall be computed according to the following formula: $C_n = T_1 / L_1 + T_2 / L_2 + \dots + T_x / L_x$ Where: C_n = combined noise exposure factor;

T = the total time of exposure at a specified sound-pressure level (in hours), and

L = the total time of exposure permitted at that level (in hours), from Tables 5-2 or 5-3, as appropriate. If the sum exceeds 1, the mixture of exposure periods exceeds the TLV.

Employee Notification

EFS will notify each employee exposed at or above an 8-hour TWA of 85 dB of the results of the monitoring.

Audiometric Testing Program

Audiometric testing will be made available to all employees whose exposures equal or exceed an 8-hour TWA of 85 dB. Testing will be provided at no cost to employees. A baseline audiogram will be provided when an employee is exposed to noise over the action level, and annually



thereafter. Audiograms for affected employees will be conducted by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining, and checking calibration and proper functioning of the audiometers being used.

8.11 Respiratory Protection Plan

ECC will preferentially implement administrative and engineering controls to minimize the need for respiratory protection on site. Controls for reducing dust contaminated with radionuclides is included in the Radiation Protection Plan, located in Appendix H, and includes but is not limited to the following:

- Personnel shall be positioned upwind to avoid working in dust generated during excavation and demolition activities, involving soils and other materials contaminated with radionuclides.
- Water or other methods will be utilized to control dust.

Air Monitoring

Air monitoring requirements and action levels are discussed in the Radiation Protection Plan and will be utilized to ensure employees are adequately protected from exposure to dust contaminated with radionuclides.

Respiratory Protection

Respiratory protection equipment utilized will be National Institute for Occupational Safety and Health (NIOSH)-approved, and respirator use will conform to ANSI Z88.2 and OSHA Title 29 CFR Part 1910.134 requirements.

ECC EHS-SOP-03-02, "Respiratory Protection," details the medical qualification and training requirements, as well as the selection, use, inspection, cleaning, maintenance, storage, and fit testing of respiratory protection equipment. This procedure complies with the requirements contained within Title 29 CFR Part 1910.134.

All personnel (including visitors) using respiratory protection shall possess a written opinion by the medical examiner of the person's ability to use the necessary respiratory protective equipment and shall have successfully passed a quantitative respirator fit test within the last 12 months. Fit-testing and any training related to respiratory protection for site personnel will be documented on the Training Acknowledgment Form.



Respiratory Protection Requirements

Level 'C' Respiratory protection, consisting of a ½ face or full-face air purifying respirator equipped with P100 cartridges, will be utilized during activities that may generate dust, contaminated with radionuclides. These tasks include but are not limited to excavation and load out activities, as well as demolition activities.

Training Requirements

All personnel using respiratory protection will be sufficiently trained in the use, limitations, proper fit, maintenance, and storage of respirators.

Respirator Cartridge Change-out Schedule

Cartridges shall be changed at a minimum of once per day, unless the user experiences breathing resistance or when workers notice any odor, irritation, or discomfort, at which time, the user will change out the cartridges immediately.

Respirator Inspection and Cleaning

Respirators will be inspected before each use by the wearer. Respirators will also be checked periodically by the SSHO, to ensure users are cleaning respirators as required. All respirators and associated equipment will be hygienically cleaned and properly stored after each use by the wearer.

Respirator Fit Testing

Employees utilizing respirators must provide written proof of an annual quantitative respirator fit test, to the SSHO, before they will be allowed to work in areas requiring respiratory protection. The fit test must indicate the style and size of the respirator that was fit tested.

Facial Hair

Personnel with facial hair, which interferes with the respirator's sealing surface, will not be permitted to wear a respirator and will not be allowed to work in areas requiring respirator use.

Medical Certification

All personnel using respiratory protection, will be required to provide proof of medical qualifications to utilize the respirator, to the SSHO, before being allowed to work in areas requiring respiratory protection.



8.12 Health Hazard and Control Program

The activities provided below are recognized as the leading cause of serious injuries and deaths in general construction work.

- Struck By Objects or Machinery
- Passenger Vehicle Operations
- Vehicle Traffic Hazards
- Falling Debris
- Machinery and Hand Tools
- Mobile Construction Equipment
- Work on or Near Water

Each type of work has specific PPE and safety requirements to perform the work, as well as specific procedures that must be followed every time the work is performed. For each definable work task, an AHA will be completed and the AHAs will include the provisions of EM 385-1-1 (copies of general AHAs for this project are included as **Appendix A** of this APP). Workers shall be trained on appropriate safety precautions, the nature of the hazards involved and any additional work methods used before performing each type of work. Additionally, all applicable SOPs will be followed (**Appendix B** of this APP).

8.12.1 Site Control

Site control procedures for this project include establishing Work Zones in order to provide site security by avoiding unauthorized access and to secure work locations between shifts. Site controls may include but will not be limited to the erection of temporary construction fencing and barricades.

Project management, as well as employees, will remain alert for any unauthorized entry and take necessary actions to control the work area.

Authorized site visitors may visit the site upon meeting the following conditions:

- Receiving site hazard and safety instructions from the SSHO
- Reviewing and complying with the essential elements of the APP
- Reviewing and sign off on Daily Tailgate for each day prior to access to work site
- Using their own, or provided PPE, to enter regulated work areas per the APP
- Reporting any observed unsafe act and/or condition at, or affecting, the work site

A Visitors Log shall be maintained at the site.

Barricades

- Use barricades to warn personnel of hazards and to direct traffic flow.
- Barricades are required around excavations, openings in floors or roof areas, wells, pits, shafts, etc.



- No barricades shall be placed closer than 2 ft from the edge of an excavation.
- Use blinking lights on road barricades after dark.
- Only use barricades that are square and level and place them at least 6 feet from an opening or no closer than 2 feet from the edge of an excavation.
- Support warning barricade rails with a stable base that will resist wind and other side forces.
- Ensure plastic Jersey Barriers are filled with required volume of water or sand prior to use.

8.12.2 Utility Avoidance and Protection

Underground Utilities

The Project Superintendent and/or SSHO shall be responsible for contacting or ensuring that subcontractors have contacted the local utility location service or private locating service, to determine whether utilities “reasonably may be expected to be encountered” during the project. A Utility Clearance Permit must be initiated and completed (including all signatures as required), before excavation of the subject area may commence.

All known utilities shall be identified and marked prior to excavation/trenching activities. Potential utilities requiring evaluation, verification, and mark-outs include electric, gas, oil, pipelines, sewers, telephone/communications, fiberoptic, and cable TV. Every effort shall be made to identify, trace, and mark utility lines. Unknown underground utilities may exist at many projects, in many areas.

EFS and the subcontractors are responsible for ensuring that safe work practices are used to identify and avoid contact with underground utilities. All utility locate activities shall be coordinated with the Project Superintendent and/or SSHO. The limits of the proposed excavation must be delineated or “white-lined” prior to utility evaluation. Identified utilities shall be marked with stakes, flags, paint, chalk, offsets, or other visible means of identification.

Intrusive soil activities conducted within a 5-ft “Buffer Zone” (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro or vacuum excavation, or similar means.

If a previously unknown utility line is identified, uncovered, or disturbed during excavation/trenching activities, the excavation activity shall stop immediately, and the project management notified. Excavation shall not recommence until the line has been evaluated, identified, traced, and/or safe work practices have been developed and implemented to limit or prevent associated hazards.



Utilities exposed during excavation or potholing must be protected. Utilities can shift or sag when the soil that was supporting and protecting the utility is removed. Utilities that are unsupported must be temporarily supported by shoring or other means as excavation continues.

Overhead Utility Lines

It is a “best safety practice” to never get closer than 10 ft to an overhead power line, regardless of whether or not it is energized. Before work begins, survey the site for overhead power lines. **LOOK UP!** All overhead wires shall be considered to be energized until proven that it is not an energized line.

Tree removal crews will not work around live power lines. Utility company personnel must verify on site that lines are de-energized before working on trees near or on power lines. If a need arises to remove trees on or near live lines, only Certified Line Clearance Tree Trimmers, equipped with electrical safety PPE, will be permitted in the area.

For other debris removal work, if lines cannot be shut down, a minimum safe distance of 10 ft must be established. Conduct a pre-work briefing to discuss the planned work. Discuss all equipment that could come into contact with the power lines (dump trucks, excavators, backhoes, cranes, etc.).

For lines rated 50 kilovolt (kV) or below, the minimum clearance between the lines and any part of the equipment (e.g., excavator, loader, and crane) or load shall be 10 ft. For lines rated over 50 kV, minimum clearance between the lines and any part of the equipment or load shall be 10 ft plus 4 inches for each 10 kV over 50 kV. Alternatively, compliance with the ANSI guidelines for operating cranes (and other equipment) near overhead power lines (ANSI Standard B30.5-1994, 5-3.4.5) [ANSI 1994] as depicted in **Table 8-3**, Equipment/Power Line Safe Distances is acceptable.

Table 8-3
Power Line Safe Distances

Power line voltage phase to phase (kV*)	Minimum safe clearance (feet)
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45
Greater than 1,000	As established by the power line owner/operator or registered professional engineer who is a qualified person with respect to



Power line voltage phase to phase (kV*)	Minimum safe clearance (feet)
	electrical power transmission and distribution
* kV denotes kilovolt	

An observer/spotter shall be designated to observe clearance of the equipment and provide timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the **ONLY** job the observer is performing when an observer is required.

The following additional precautions should be followed around overhead utility lines:

- Post warnings on equipment cautioning the operators to maintain safe clearance between energized power lines and their equipment.
- Operate all equipment at a slower-than-normal rate in the vicinity of power lines.
- Exercise caution near long spans of overhead power lines since wind can cause the power lines to sway laterally and reduce the clearance between equipment and the power line.
- Mark safe routes where equipment must travel beneath power lines.
- Exercise caution when traveling over uneven ground that could cause the equipment to weave or bob into power lines.
- Keep all personnel well away from the equipment whenever it is close to power lines.
- Prohibit persons from touching the equipment or loads until a signal person indicates that it is safe to do so.

To protect against electrical shock injury in the event of contact between a piece of equipment and an energized line, the following procedures are recommended:

- The equipment operator should remain inside the cab.
- All other personnel shall keep away from the equipment, crane, ropes, and/or load, as the ground around the equipment might be energized.
- The equipment operator should try to remove the equipment from contact by moving it in the reverse direction from that which caused the contact.
- If the equipment cannot be moved away from contact, the operator shall remain inside cab until the lines have been de-energized.
- If the equipment catches fire, then the operator should jump off as far as possible, then “shuffle” away to a safe distance.

8.12.3 Mobile Equipment Operations

Physical hazards can arise from off-loading heavy equipment or safety equipment from tractor-trailers and locating equipment to designated areas of use. Avoid moving equipment and immobilizing hazardous objects mitigates these hazards. Personnel will be alert at all times while working around any heavy equipment. Field personnel may be exposed to physical injury hazards



associated with equipment operation during soil excavation. These hazards include noise, struck-by injuries, eye hazards, hand and foot injuries, and related hazards. While the exact size and type of heavy equipment to be used on projects will be varied, the following minimum measures will be implemented for equipment operations to mitigate these hazards:

- High visibility vests (ANSI Class 2 or equivalent) will be worn when working around heavy equipment, roadways, or other vehicular traffic (entire project site).
- Good housekeeping and adequate workspace will be established before operation of any equipment and will be maintained throughout the duration of the operation.
- Equipment will be inspected for condition and operation prior to use and documented.
- Equipment will be equipped with properly functioning and audible back-up alarms.
- Field personnel and or approved Site Visitors (pedestrians) will only approach operating equipment from the operator's angle of view, and after making eye contact with equipment operator.
- Only trained and qualified persons will be assigned to operate individual equipment.
- If so equipped, seatbelts must be worn at all times.
- Every person riding on a piece of equipment must be in a seat.

8.12.4 Work on or Near Water

When working over or near water (within 6 feet of an unprotected edge of water 3 feet deep or more), the following requirements apply:

- All employees and subcontractors must wear a U.S. Coast Guard (USCG) approved Type III or V or better, personal flotation device (PFD).
- PFDs should be fitted with a Safety of Life at Sea convention compliant whistle or noise making device.
- When worn at night, PFDs shall have at least 31 square inches of reflective material attached to its front side and backside, per USCG requirements. Additionally, each PFD shall be equipped with a USCG-approved automatically activated light.
- PFDs are not appropriate for an entrapment hazard such as deep mud.
- Prior to each use, the user will examine the PFD for deterioration or damage that might affect their strength and buoyancy. Defective PFDs shall be removed from service and repaired or replaced.
- Fall protection systems should be utilized in conjunction with PFD vests and other work near water controls where possible. Examples include guard rails, fall arrest systems, lifelines, harnesses, or safety nets.
- Ring buoys with at least 90 feet of line shall be provided and readily available for employee rescue operations. The distance between ring buoys shall not exceed 200 feet.
- A USCG approved life-saving safety skiff shall be available for emergency use.
- One person should remain on shore as a look-out.
- If a team member falls into the water, a ring buoy or other device will be extended to the person to pull them to safety. Once the person has been safely retrieved, obtain necessary medical attention.



8.12.5 Personal Protective Equipment

General PPE Requirements

The client, EFS, and subcontractors must form a team to assure safety on every job site and prevent serious accidents. All unsafe conditions must be reported and the hazard reduced before work may proceed. **Table 8-4** lists the minimum standards for most types of PPE to be used on the project.



Table 8-4 - Minimum PPE for All Workers

PPE	REQUIREMENT
Footwear	Protective safety footwear (steel or composite toe) boots (minimum height of 6 inches) will be worn by all workers on the project. Boots must have ANSI Z-41 or equivalent approval.
Head Protection	Hard hats will be worn by all employees at all times in all areas of the project. Hardhats must meet the requirements of ANSI Z-89 or equivalent.
Eye Protection	Protective safety glasses will be worn by all site workers at all times, in all areas of the project. In addition, safety goggles and/or face shields may be required for certain tasks, based on the discretion of the SSHO. Workers performing welding and cutting with torches or arc-welding equipment shall wear the proper shaded lenses in face shields and/or goggles. All eye protection must meet ANSI Z-87 or equivalent requirements.
Hearing Protection	Protective ear plugs or muffs shall be worn when workers are exposed to potentially damaging noise including jack hammers, flight line operations, power saws and grinders, and combustion engines without mufflers. This is to ensure that no employees are exposed to noise levels above established exposure limits.
Gloves	All workers shall use protective gloves appropriate to the task.
Clothing	Workers shall wear clothing that protects their skin from damage –shirts and long pants at a minimum. Workers exposed to welding operations, chemicals, abrasive blasting, wet concrete, asbestos, and other hazardous contaminants will wear appropriate clothing for the hazard. Workers using power tools or operating equipment shall not wear very loose or flowing clothing that may get caught in the equipment. For specific chemical hazards, PPE will be worn according to established exposure limits.
Chainsaw Operations	Chain saw chaps Gloves Hard hat with mesh face shield Safety glasses Hearing protection Safety Toed Boots
High Visibility Vest	All employees will wear an ANSI Class 2 (or equivalent, per the SSHO), reflective safety vest at all times while working on the project.
Personal Flotation Device	U.S. Coast Guard (USCG) approved Type III or V or better, personal flotation device (PFD), when working within 6 feet of an unprotected edge of water, 3 feet or more deep

Dust Control, General

Dust may be produced during construction activities. Dust will be controlled by working slowly when visible dusting occurs, applying water, limiting drop heights, and establishing work zones to limit public exposures. At the temporary staging facilities, these practices will be implemented as well as watering the roads if required.



Indigenous Biological Hazards

Attention to biological hazards will be included in the daily and weekly safety meetings. Personnel will be instructed to be aware of their work area surroundings at all times. Employees are expected to report all sightings of biological hazards to the SSHO. The SSHO (or designee) will ensure sightings are communicated to the workers immediately and during daily pre-job briefings to assist workers in avoidance and to maintain appropriate awareness level.

Potential biological hazards that may be encountered during field activities include:

- Wild or domestic animals
- Snakes
- Spiders
- Flying Insects (bees, wasps, mosquitos)
- Ticks
- Poisonous Plants (poison ivy, poison oak, poison sumac)

Personnel should use the following precautions to avoid biological hazards:

- Practice due diligence and maintain awareness of work site and surroundings, especially when entering undisturbed and vegetated portions of the site.
- Apply an insect repellent containing DEET as needed in accordance with manufacturer's instructions when in insect- and spider-infested areas.
- Periodically perform self-examinations for the presence of ticks, especially on the scalp and in the groin area, especially following work in undisturbed areas of the site.
- If poisonous plants are indigenous to the project sites, ensure all employees are provided awareness training in order to recognize, identify, and avoid these plants.
- Individuals with life-threatening allergies are encouraged to report them to their supervisor, confidentially, and disclose any treatment needed, should the individual become incapacitated.

Health Hazard Controls

EFS will prioritize the following control hierarchy for health hazards on the project site:

- Elimination of the hazard – substitute the process or materials
- Engineering controls – wet methods for concrete cutting, concrete surface grinding, dusty earth moving operations; general or local exhaust ventilation for welding; mechanical ventilation for confined spaces
- Work Practice controls – limiting or modifying the time of exposure to maintain cumulative exposures below health hazard concerns. Limiting the duration of exposure to noisy operations or radiation sources are examples. Performing work in high levels of personal protection during night shift or early morning hours is another example



- Personal Protective Equipment – generally a last resort, to be used in combination with other controls.
- Housecleaning and contaminant control – decontamination areas and measures used to control the spread of contamination, regular cleaning of support facilities and if required by SHM, testing of contact surfaces to ensure proper cleaning/contamination control.

The specific control measures to be used for an anticipated exposure will be identified in the Controls column of the AHA for the activity where exposure may occur.

8.12.6 Utility Vehicles (UTVs)

For the purposes of this Section, utility vehicles are defined as specialty vehicles designed to perform off-road utility tasks such as passenger and cargo transportation. A site-specific AHA for the use of UTVs will be developed and submitted for approval before UTVs are used on the site.

Training

- Operators must be familiar with the use of all controls and understand proper moving, stopping, turning and other operating characteristics of the vehicle.
- Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. At a minimum, training shall be documented and shall address:
 - Basic riding tips from the manufacturer's published literature for each vehicle
 - Reading terrain
 - Climbing hilly terrain
 - Descending a hill
 - Traversing a slope
 - Riding through water
 - Cargo carriers and accessories
 - Loading and unloading
 - Troubleshooting
 - Proper preventative maintenance (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines).
- A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements.

Equipment

- UTVs must be equipped with the following:
 - An adequate audible warning device (horn), in operable condition, at the operator's station.
 - Properly functioning and audible backup alarm
 - Brake lights in operable condition regardless of light conditions
 - Operable rear-view mirror(s).



- Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition, and a yellow flashing light or equivalent.
- Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seat belts. Passengers may not ride in the vehicles back cargo area unless the vehicle is otherwise equipped. When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described in Section 18.J.07 of EM 385-1-1.
- The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.
- Cargo items will be secured as necessary to prevent movement/tipping. All loads over 50 lbs. (22.7 kg) - to include medical litters - must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.
- Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer's recommendations.
- Seat belts and anchorages meeting the requirements of 49 CFR Part 571 (DOT, Federal Motor Vehicle Safety Standards) shall be installed in all utility vehicles and will be worn by operators and passengers.
- Operators and passengers shall always wear goggles when a utility vehicle, not equipped with a windshield, is in motion.
- Utility vehicles will not normally be driven on public roadways except to cross the roadway and will only be driven on a public roadway at designated crossing points or with a road guard.
- Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPS, seat belts, and placement of "Slow Moving Vehicle" emblems where required.
- When not equipped with ROPS, operators and passengers of utility vehicles will wear approved head protection (helmet) that at a minimum conforms to DOT 218 standards or equivalent and protective goggles or face shield.

8.13 Hazard Communication Program

The EFS Hazard Communication Program applies to all known hazardous substances in the workplace that EFS employees and their subcontractors may be exposed to under normal conditions of use or in a foreseeable emergency, such as equipment failure or rupture of containers, resulting from workplace operations.

Each hazardous material will be documented before being brought onto the job site. The Safety Data Sheets (SDSs) and proposed use and storage locations will be reviewed by the EFS SSO for approval. Site personnel will have access to the hazardous material inventory and SDS file upon request.



EFS will communicate this hazard communication program to project employees and subcontractors and provide information about chemical hazards and controls through SDSs, chemical inventory, chemical labeling, and chemical storage. EFS will communicate employee information and training programs as detailed in this written hazard communication program.

Safety Data Sheets

A SDS will be available for each chemical in the Chemical Inventory List. A copy of the SDS supplied by the manufacturer or distributor of the chemical(s) will be kept with the SSHO in a folder or binder, in the office trailer. The SSHO will be responsible for obtaining SDSs for all hazardous chemicals or materials present at the project site.

The SSHO will review incoming SDSs for new and important health and safety information. The SSHO is responsible for disseminating the SDS information to the appropriate workers at the appropriate preliminary, initial and follow-up inspections of the DFOV where the hazardous chemical or material is to be utilized for which the SDS was written. Supervisors and employees will be informed of all new SDSs as soon as possible. If an SDS is missing, a new SDS will be requested from the manufacturer within 7 days.

SDSs will be kept in a conspicuous location (i.e., office trailer, SSHO vehicle, etc.) at all times.

Employees and/or subcontractors are responsible for reading the SDSs for substances they use.

Chemical Inventory

The chemical inventory will be placed with the SDS binder in a conspicuous location at all times. The SSHO is responsible for updating the Chemical Inventory List and adding the appropriate SDS whenever a new chemical is brought on-site.

Chemical Labeling

EFS will not accept or release hazardous chemicals or materials for use unless the original container is clearly labeled with at least the following information: product identifier; hazard statement(s); pictogram(s); precautionary statement(s); the name, address and telephone number of the manufacturer, importer or other responsible party. If the hazardous chemical(s) or material(s) is transferred to a secondary container, the secondary container must be clearly labeled with at least the following information: product identifier and words, pictures, symbols, or combination thereof.

All labels must be legible, in English, and prominently displayed on the container. Labels will not be defaced or removed unless the container is immediately marked with the required information. Unlabeled containers should be immediately reported to the Site Supervisor or the SSHO. The name of the material that appears on the manufacturer's label will be the same as the name that appears in the chemical area or Chemical Inventory List as well as the SDS.



Chemical Storage

Hazardous chemicals or materials will be properly stored in approved flammable storage lockers, corrosive storage lockers, shelves or cabinets.

All incompatible chemicals or materials will be properly separated and stored by hazard classes.

No open flames, heat sources or smoking will be allowed in the vicinity of flammable liquids or materials.

Employee Information and Training

Project employees and subcontractors will be trained on the hazards and proper uses of all hazardous chemical(s) or materials in their work area:

- At the time of their initial assignment;
- Whenever a new hazardous chemical(s) or material(s) is introduced into their area; and
- Whenever EFS or the subcontractor receives updated SDSs containing new information indicating significant increased risk or changes in the use of personal protective equipment.
- Overview of the Hazard Communication Regulation (29 CFR 1910.1200) and the elements of EFS's Hazard Communication Program;
- Operations involving hazardous chemicals or materials in their work area and methods of detecting and identifying them;
- Location and availability of the SDSs and a written hazard communication program;
- How to read an SDS and container labels;
- Physical properties and health effects of hazardous chemicals and materials and measures to be taken by the employee to protect themselves;
- Use of engineering controls, personal protective equipment and work practices to prevent or lessen exposure to hazardous chemicals or materials;
- Emergency and first aid procedures to follow in case of exposure to hazardous chemicals or materials.

AHAs will be developed for each DFOV with hazardous activities, and employees and/or subcontractor will be trained in the hazardous chemicals or materials to be used or encountered in that activity when the AHA is discussed.

8.14 Process Safety Management Plan

Not applicable under the current SOW.

8.15 Lead Abatement Plan

Not applicable under the current SOW.



8.16 Asbestos Abatement Plan

Not applicable under the current SOW.

8.17 Radiation Safety Program

Refer to the Radiation Protection Plan , located in Appendix H

8.18 Abrasive Blasting Plan

Not applicable based on the current SOW.

8.19 Heat and Cold Stress Monitoring Plan

This Plan applies to the project identified above and will be incorporated into the APP. Subcontractors are required to comply with this program by virtual of their coverage under the APP.

8.19.1 Heat Stress and Heat Strain

Heat stress is the net heat load to which a worker may be exposed from the combined contributions of metabolic cost of work, environmental factors and clothing requirements. Heat stress is a hazard during warm weather or when personnel are wearing personal protective equipment (PPE) that aggravates the heat stress hazard. Heat stress can occur even when temperatures are moderate if the body's physiological processes fail to maintain a normal body temperature.

Heat strain is the overall physiological response resulting from heat stress. The resulting physical reactions that occur are fatigue, irritability, anxiety, and a decrease in concentration, dexterity, and/or movement. Onset of signs and symptoms of exposure can occur rapidly, and may progress to a medical emergency (i.e., heat stroke) without intervention. In extreme cases, death can result if the patient is not given immediate treatment.

Symptoms of Heat Exhaustion

Heat exhaustion occurs when your body cannot sweat enough to cool you off. It generally happens when you are working or exercising in hot weather. Symptoms include:

- Fatigue, weakness, dizziness, or nausea
- Cool, clammy, pale, red, or flushed skin
- Heavy sweating

First Aid for Heat Exhaustion

- Get the person out of the sun and into a shady or air-conditioned location
- Lay the person down and elevate the legs and feet slightly
- Loosen or remove the person's clothing
- Have the person drink cool water, not iced, or a sports drink containing electrolytes



- Cool the person by spraying or sponging him or her with cool water and fanning
- Monitor the person carefully. Heat exhaustion can quickly become heatstroke. If fever greater than 102°F, fainting, confusion or seizures occur, dial 911 or call for emergency medical assistance.

Symptoms of Heat Stroke

Heat exhaustion can sometimes lead to a heat stroke. Heat stroke requires emergency treatment. It happens when your body stops sweating but the body temperature continues to rise, often to 105°F or higher. Symptoms include the following:

- Cessation of sweating
- Confusion, delirium, or unconsciousness
- Hot, dry, red or flushed skin, even under the arm pits
- Rapid and shallow breathing
- Chills
- Irritability
- Malaise
- Disorientation or confusion

First Aid for Heat Stroke

- It is vital to lower a heat stroke victim's body temperature. Seconds count.
- Call 911 and get an ambulance on the way as soon as possible.
- Move the person out of the sun and into a shady or air-conditioned space.
- Pour water on them, fan them, apply cold packs.

Control Measures

Where monitoring indicates a possible heat stress hazard the following safety procedures shall be implemented:

General Controls

- Review signs and symptoms of heat strain, as well as controls and First Aid measures with site personnel.
- Encourage employees to eat a normal diet and get proper rest.
- Encourage employees to refrain from consuming diuretics, including caffeine from coffee and tea beverages, or any form of alcohol. (Note: Consumption of alcohol is prohibited during working hours). Counsel and monitor workers on medications that may affect blood pressure, sweating, body temperature regulation, or kidney function.
- Adjust expectations of those returning to work after absence from heat exposure situations and encourage them to eat salty foods (with approval of physician for those on salt-restricted diets).
- Provide potable drinking water and encourage workers to about 1 cup every 20 minutes.



- Permit self-limitation of exposures and plan frequent rest breaks.
- Encourage workers to report signs and symptoms of heat strain and not to try to work through it.
- Encourage the buddy system to detect signs and symptoms in co-workers.
- Provide shade (i.e., fixed or portable canopy) and/or cool rest areas.

Job-Specific Controls

Where the screening or physiological monitoring discussed below exceed the criteria, the job-specific controls for this project will include the following:

- Engineering controls to reduce workload, (e.g., mechanical vs. manual material handling where possible).
- Mobile construction equipment will have functioning air conditioners and be operated with the doors/windows closed.
- Office trailer and vehicles will have functional air conditioning to provide cool rest locations during breaks.
- Wear breathable polypropylene disposable coveralls over modesty clothing for activities requiring Modified Level C.
- Use heat reducing PPE, such as cool vests, head bands, wrist bands, etc.
- Modify work schedule to take advantage of the cooler parts of the day.
- Establish work/rest regimens to reduce exposure times when physiological monitoring indicates heat strain conditions.

Heat Stress and Heat Strain Monitoring

Heat stress and heat strain monitoring shall begin when ambient conditions exceed 85°F when working in Level D and 70°F when working in Modified Level C and above. For clear weather conditions (i.e., 100% sunshine) ambient temperatures shall be decreased by 5°F (i.e., 65°F and 80°F, respectively) to determine when to begin monitoring. Ambient conditions shall be determined by maintaining a properly calibrated outdoor thermometer in the shade at each workstation or by monitoring local weather reports throughout each work shift.

Environmental Monitoring

Use a Wet Bulb – Globe Temperature (WBGT) monitor to perform heat stress screening in accordance with the **Table 8.19-1** (Acclimatized Workers) and **Table 8.19-2** (Un-acclimatized Workers) below. Clothing adjustment factors are included in **Table 8.19-3**.

If the WBGT levels (corrected for clothing ensemble) for the particular workload and work/rest cycle are exceeded, then implement the General Controls and either perform physiological monitoring as described below or implement Job-Specific Controls such as those listed above.


Table 8.19-1 - WBGT Screening Criteria for Acclimatized Workers

Allocation of Work in a Cycle of Work and Recovery	Light	Moderate	Heavy	Very Heavy
75% - 100%	88°F 31°C	82.5°F 28°C	-	-
50% - 75%	88°F 31°C	84°F 29°C	81.5°F 27.5°C	-
25% - 50%	89.5°F 32°C	86°F 30°C	84°F 29°C	82.5°F 28°C
0%-25%	90.5°F 32.5°C	88.5°F 31.5°C	87°F 30.5°C	86°F 30°C

From ACGIH TLVs® and BEIs® 2014.

Note: Light moderate work includes operating heavy equipment. Heavy work includes hand shoveling or other manual labor activities.

Table 8.19-2 - WBGT Screening Criteria for Un-acclimatized Workers

Allocation of Work in a Cycle of Work and Recovery	Light	Moderate	Heavy	Very Heavy
75% - 100%	86°F 28°C	77°F 25°C	-	-
50% - 75%	83.5°F 28.5°C	79°F 26°C	75°F 24°C	-
25% - 50%	85°F 29.5°C	80.5°F 27°C	78°F 25.5°C	76.1°F 24.5°C
0%-25%	86°F 30°C	84°F 29°C	82°F 28°C	80.5°F 27°C

From ACGIH TLVs® and BEIs® 2015.

Table 8.19-3 – Clothing-Adjustment Factors for Some Clothing Ensembles*

Clothing Type	Addition to WBGT (°C)
Work clothes (long sleeve shirt and pants)	0
Cloth (woven material) coveralls	0
Double-layer woven clothing	3
SMS polypropylene coveralls	0.5
Polyolefin coveralls	1
Limited-use vapor barrier coveralls	11

*These values must not be used for completely encapsulating suits, often called Level A. Clothing Adjustment Factors cannot be added for multiple layers. The coveralls assume that only modesty clothing is worn underneath, not a second layer of clothing.

From ACGIH TLVs® and BEIs® 2014.

Alternate Environmental Monitoring Procedures

Where permitted by the client, EFS may use the OSHA Heat Tool mobile app for monitoring environmental conditions based on the HEAT INDEX. Precautions recommended for the different Heat Index levels should be followed and are consistent with the General Controls and Job-Specific Controls listed above. Where the HEAT INDEX level falls in the High or Very High to Extreme categories, implement physiological monitoring in addition to Job Specific-Controls. The Heat Tool app can be accessed in OSHA's Heat Stress prevention topic section at <https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>



Physiological Monitoring

For site personnel wearing vapor barrier clothing and for site personnel where Job-Specific Controls may not be sufficient to control heat strain, physiological monitoring will be performed. Physiological monitoring will also be performed when workers report signs and symptoms of heat strain.

Select workers whose exposure is most extreme or who are probably the least heat tolerant. Heat tolerance may be affected by acclimatization, body size, general health and physical fitness, medications, and age. Heat strain should be evaluated by monitoring the heart rate and temperature.

Where an individual's pulse rate or temperature exceeds the criteria below, action should be taken to limit the individual's heat exposure. However, where a pattern develops among workers of exceeding the criteria, then additional Job-Specific Controls shall be implemented for the work group.

Pulse Rate

The radial pulse should be taken for 30 seconds one minute after beginning to rest (i.e., at the beginning of a rest break). This rate is multiplied by two to determine the heart rate at initial rest. This rest should not exceed 110 beats per minute (bpm). If the resting heart rate exceeds 110 bpm, then modify the work rest schedule for the individual by decreasing the work period and increasing the rest period.

Heart rate monitoring should be recorded on an Exposure Monitoring Log. Monitoring should begin at the first break. The first rest break should be taken within the first hour of work when ambient conditions exceed the screening criteria. If working in Level D, and within the first 30 minutes if ambient conditions exceed 70°F if working in Modified Level C.

Oral Temperature

Use a digital oral thermometer with disposal plastic sleeves or similar device (e.g. aural thermometer) to measure the oral temperature at the end of the work period (before drinking).

If an individual's temperature exceeds 99.6°F (or 37.6°C), adjust the work rest cycle.

Do not permit a worker to wear semipermeable or impermeable clothing when his/her oral temperature exceeds 100.6°F (or 38.1°C).

- **Never ignore signs and symptoms of heat-related disorders.**

Training

Workers on project sites will be trained by the SSHO at site orientation, or during special tailgate meetings. The training will include the elements of this program, and in particular:

- Heat related disorders and First Aid measures
- Environmental factors and workload impacts on heat strain
- Personal factors impacting heat strain including health status, caffeine, alcohol and drugs



- Reporting Signs and Symptoms of exposure
- Monitoring measures to be employed on the project
- General and Job-Specific Controls to reduce exposure
- Emergency Response

Documentation

The SSHO will record periodic environmental monitoring results in the Logbook. Physiological monitoring will be recorded on the Physiological Monitoring Form. Records will be maintained on the job site and will be archived with the project files at the end of the job.

8.19.2 Cold Stress

Cold stress hazards are most likely to occur at low temperatures or low wind chill factors, with wet, windy conditions contributing to risk. Where cold stress is a potential hazard (temperatures less than 40°F) workers will be trained on the information in the attached Fact Sheet.

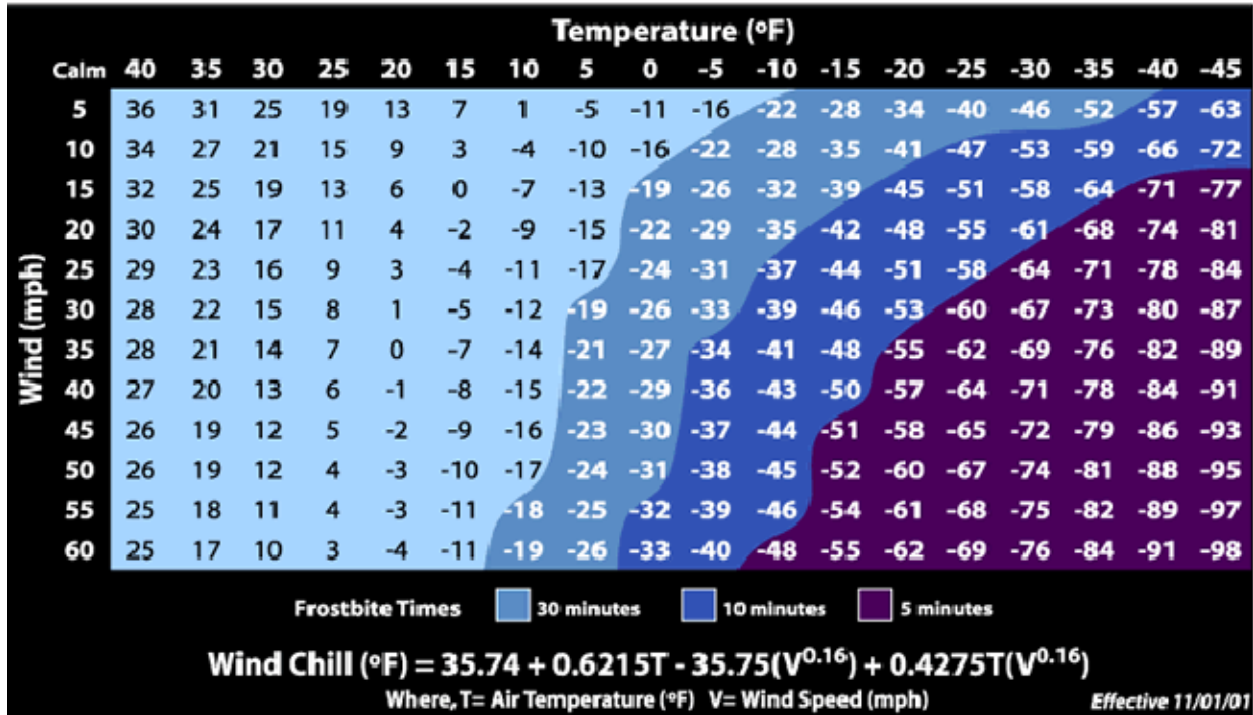
As a precautionary measure, employees will wear layers of loose-fitting clothing including insulated coveralls, head cover (perhaps a liner beneath a hard hat), and boots when temperatures fall below 40°F, including wind chill. Protection of the hands, feet, and head is particularly important because these are likely to be injured first by cold. However, actual injury to hands, feet, and head is not likely to occur without prior development of early signs of hypothermia such as numbing and shivering. Bare skin contact with cold surfaces (below 32°F) will be avoided.

The wind chill factor is the cooling effect of any combination of temperature and wind velocity or air movement. An anemometer can be used to measure wind velocity. The wind chill index (below) should be consulted when planning for exposure to low temperatures and wind. The SSHO will monitor weather forecasts and determine wind chills at least every 4 hours when the temperature drops below 20°F. The wind chill index does not take into account the specific part of the body exposed to cold, the level of activity that affects body heat production, or the amount of clothing being worn.

Like with heat strain, employees are permitted and encouraged to self-limit outdoor work activities when symptoms of cold stress are experienced. The buddy system is also encouraged to ensure that employees frequently check on co-workers in temperature extremes. A temperature-dependent work regimen limiting lengthy periods of outdoor activity may be necessary. If required, this will be developed by the SSHO in coordination with the Project Safety and Health Manager.



NWS Windchill Chart



References

National Weather Service <http://www.nws.noaa.gov/om/winter/windchill.shtml>

OSHA's Campaign to Prevent Heat Illness in Outdoor Workers.
<https://www.osha.gov/SLTC/heatillness/index.html>



Injury Prevention: Fact vs Fiction Cold Weather Injuries

FACT SHEET 12-004-0415

What causes Cold Weather Injuries?

Cold weather injuries (CWIs) can occur due to an imbalance of body temperature regulation, where heat loss is greater in an area of the body (or the body core) than heat production. There are 4 primary types of cold injuries: hypothermia, frostbite, non-freezing cold injuries, and injuries related to cold exposure. Tables 1-4 provide details on these injuries.¹

Why are CWIs a concern to the Army?

CWIs are preventable, yet if early signs and symptoms go unrecognized or preventive measures are not taken, these injuries may result in permanent injury and even death. A typical CWI casualty is a 20 year-old male at the rank of E-4 and below and often from a warm climate. However, anyone can become a CWI casualty.²



How can Soldiers protect themselves from a CWI?

Soldiers should be aware of risk factors and increase resilience by consuming a healthy diet with plenty of fluids, maintaining fitness levels according to Army standards, and getting quality sleep each night. Dressing properly for the weather conditions in a way to easily adjust (layers), and balancing the time and amount of activity spent in cold weather conditions will reduce risks.^{1,3,4,5}

Prevention of Cold Weather Injuries

Clothing

- ❖ Wear uniform properly (layers worn loosely).
- ❖ Keep socks & clothes dry (use sock liners and foot powder).
- ❖ Remember the acronym **C-O-L-D**
 - Keep it **CLEAN**
 - Avoid **OVERHEATING**
 - Wear clothing **LOOSE** and in **LAYERS**
 - Keep clothing **DRY**

Eyes

- ❖ Wear dark UV protective glasses
- ❖ If no sun glasses – improvise with cut slits in cardboard/cloth; or use tape over regular eyeglasses

Skin

- ❖ Keep your skin clean, covered, & dry
- ❖ Use sunscreen and lip balm
- ❖ Use gloves to handle all equipment and fuel products

Hydration

- ❖ Drink warm liquids
- ❖ Monitor urine color for dehydration

Environment

- ❖ Use warming tents when needed
- ❖ Monitor conditions, especially the wind chill index
- ❖ Use anti-slip shoe gear if outside extensively

Other

- Conduct NCO checks and look after your battle buddy

What factors increase the risk of having a CWI?

All Soldiers regardless of rank are susceptible to a CWI in the right conditions. However, surveillance data from the Army and other Services indicate that rates of cold injuries appear higher among African Americans, women, Service members under 20 years old, and enlisted personnel.² Additional risk factors are discussed below.^{1,7}

✦ Prior cold injury or medical conditions

Soldiers who have had a cold injury in the past are much more likely to develop a new cold injury sooner or one of more severe nature in the future. Existing medical conditions may predispose an individual to a CWI. For example, Raynaud's Disease is a disorder that causes blood vessel constriction in cold temperatures or during emotional distress, resulting in reduced blood flow to the extremities (e.g., fingers & toes).⁸ Other conditions, such as anemia, diabetes, sickle cell disease, hypotension, and atherosclerosis, may also increase susceptibility to frostbite and injuries related to cold exposure.¹

✦ Dehydration

Inadequate fluid intake affects the body's ability to sustain physical activity, which in turn affects thermoregulation (i.e., the balance between heat production and loss). In cold environments sensitivity to thirst declines, which can increase the risk of dehydration during strenuous activity, where fluid loss often exceeds intake.^{1,4,5}

✦ Over- and Under- Activity

Vigorous exercise/activity induces sweating, which leads to wet clothing and subsequent increased heat loss. Conversely, under-activity results in low heat production, which may lower the body's core temperature.^{1,4,5}

✦ Tight clothing

Close-fitting clothing reduces insulation and may restrict movement, resulting in heat loss. Clothing should be worn loosely and layered to allow adjustments as physical activity levels and environmental conditions change.^{1,4,5}

✦ Inadequate nutrition

Underfeeding can cause low blood sugar (hypoglycemia) which impairs shivering, thereby making it difficult to generate body heat. Low carbohydrates stores also limit the ability to maintain physical activity.

✦ Alcohol & nicotine

Alcohol imparts a sense of warmth and causes dilation of skin blood vessels which increases heat loss to the environment. It may also impair the senses and judgment, making it difficult for a Soldier to detect signs and symptoms of a CWI. Tobacco use (smoking or chewing) causes increased constriction of skin blood vessels, which increases the risk for frostbite.^{1,4,5}

✦ Medications

Some medications may affect thermoregulation by impairing vasoconstriction. These include benzodiazepines, tricyclic antidepressants, barbiturates, and general anesthetics.^{1,4,5}

U.S. Army Public Health Command - Injury Prevention Program
us.army.apg.medcom-phc.mbx.injuryprevention@mail.mil 410-436-4655/DSN 584-4655
5158 Blackhawk Road, APG, MD 21010-5403
Approved for Public Release, Distribution Unlimited



Table 1. Hypothermia

Abnormally low core body temperature (below 95°F); occurs when cold conditions are severe, windy, clothing is wet or during periods of inactivity; may also occur in warm climates during extended water exposure or immersion.

- **Symptoms:** In the initial stages, shivering, dizziness, irritability, confusion, slurred speech, stumbling; in severe stages, shivering stops, desire to lie down/sleep, faint heartbeat and breathing, unconsciousness
- **Prevention:** Wear layers keep dry; avoid cotton cloth in cold as it hold perspiration
- **Treatment:** Drink warm, sweet liquids if conscious; rewarm with body-to-body contact or in warmed sleeping bag; give CPR if needed; evacuate immediately if severe

Table 2. Frostbite

Freezing or crystallization of tissues; exposure time can be minutes or instantaneous if skin is exposed to extreme cold or high winds; the extremities (fingers, toes, ears, nose) are affected first.



- **Symptoms:** Skin feels cold, stiff, or woody; turns to gray or waxy-white color; numbness, tingling or stinging sensation; blisters; absent/restricted joint movement; as frostbite progresses, underlying tissue hardens and skin turns purple or blackens
- **Prevention:** Avoid tight socks/boots and keep them dry; use gloves to protect skin from cold equipment; avoid cotton clothing that holds perspiration
- **Treatment:** Remove constricting clothing and jewelry; rewarm affected area evenly with body heat until pain returns; do not rewarm with hot water/open fire/stove or intense heat; do not rub/massage, if injury could refreeze during evacuation or victim must walk; do not massage affected area or rub with snow; seek medical care

Table 3. Non-freezing cold injuries

Chilblains

Occurs in cold, wet conditions due to prolonged exposure of bare skin; commonly affected areas include ears, nose, fingers, and toes.



- **Symptoms:** Skin initially pale & colorless; worsens to achy sensation then numbness; becomes red, swollen, hot, itchy, & tender upon rewarming; blistering occurs in severe cases
- **Prevention:** use glove to protect bare hand for cold equipment; avoid cotton clothing that holds perspiration; keep gloves on even after PT until body warms.
- **Treatment:** Prevent further exposure; wash, dry area gently; rewarm with body heat; do not rub or massage; use dry sterile dressing; seek medical aid

Trench/Immersion Foot

From prolonged exposure to water at temperatures below 50°F; high risk during wet weather; exposure to wet areas, or when sweat accumulates in boots or gloves.



- **Symptoms:** Skin initially appears wet, white, shriveled; sensations of pins & needles, tingling, numbness, then pain; discoloration (red, bluish, or black); becomes cold, swollen, & waxy; may develop blisters, open weeping, or bleeding; flesh dies in extreme cases.
- **Prevention:** Keep feet dry: Change socks & apply foot powder at least every 8 hours or whenever wet/sweaty; do not use blousing bands; bring extra boots to the field; dry boots by stuffing with paper towels.
- **Treatment:** Remove wet socks/shoes, do not rub/massage, break blisters or walk on; Seek medical care.

Table 4. Other conditions and injuries related to cold exposure

Dehydration

While not an injury per se, excessive loss of body fluids can slow or prevent normal body functions; which may increase chances of frostbite or hypothermia.

- **Symptoms:** Dark urine, irritability, dry mouth/tongue/throat, increased heartbeat, dizziness, stomach cramping or vomiting, mental sluggishness, unconsciousness.
- **Prevention:** drink adequate water/fluids (e.g., > 3 quarts daily) n monitor urine color darkness (See USAPHC Urine Color Card)
- **Treatment:** Drink water or warm liquids, including coffee (amount of diuresis caused by the caffeine is not greater than the amount of fluid consumed, thus these drinks are not excessively "dehydrating").⁹⁻¹² Do not eat snow; rest.

Sunburn

Burning of skin due to overexposure to sun/UV light; high altitude thinner air allows more sun rays to penetrate the atmosphere; in snowy conditions UV rays reflect off the snow and enhance burning.



- **Symptoms:** Chills, fever, redness, slight swelling (1st degree), pain, blistering (2nd degree)
- **Prevention:** Use sunblock (e.g. 30 SPF) on exposed skin
- **Treatment:** Apply soothing skin creams (mild cases), take aspirin for pain; seek medical care (severe cases).

Carbon Monoxide Poisoning

Occurs when oxygen in body is replaced by carbon monoxide, a colorless, odorless gas that can accumulate from inadequate ventilation of engines, stoves, & heaters.

- **Symptoms:** Drowsiness, headaches, ringing in ears, bright red lips/eyelids, nausea, unconsciousness, death
- **Prevention:** Only used approved heaters; do not sleep in/hear idling vehicles; post a fire-guard if using heater when sleeping
- **Treatment:** Move to fresh air, provide mouth-to-mouth resuscitation if victim is not breathing, seek medical aid promptly

Snow Blindness

Inflammation and sensitivity of eyes caused by overexposure to UV rays reflected by snow/ice.



- **Symptoms:** Gritty feeling in eyes, redness & tearing, pain during eye movement, headache
- **Prevention:** Wear sunglasses/improvise with slits in cardboard/cloth; tape over eye glasses
- **Treatment:** Remove from sunlight; blindfold eyes/cover with cool, wet bandages; seek medical attention

Slips, Trips, and Falls

Ice and snow significantly increase the likelihood of fall injuries, which most often include fractures and sprains/strains to lower extremities (ankles, feet, legs) as well as wrists and arms.

- **Symptoms:** pain may be sharp and immediate, with soreness or swelling persisting/increasing hours or days. However some injury pain/soreness may not occur for 1-2 days.
- **Prevention:** Watch for ice/snow slip hazards; consider anti-slip foot wear
- **Treatment:** Seek medical advice for pain limiting movement.

Information Sources:

1. TB MED 508 Prevention and Management of Cold Weather Injuries
<http://www.usarlem.army.mil/assets/docs/publications/articles/2005tbmed508.pdf>
2. Armed Forces Health Surveillance Center (AFHSC, 2013). Cold weather injuries, active & reserve U.S. Armed Forces, July 2008- June 2013. MSMR, 20(10), 12.
http://www.afhsc.mil/documents/pubs/msmr/2013/20_n10.pdf#Page=12
3. TC 21-3 Soldier's Handbook for Individual Operations & Survival in Cold-Weather Areas
4. US Army Research Institute of Environmental Medicine Guidance webpage -
<http://www.usarlem.army.mil/index.cfm/publications/guidance>
5. Borden Institute – Water Hydration
<http://www.usarlem.army.mil/assets/docs/publications/articles/2010HydrationPDF.pdf>
6. Raynaud's Disease. MedlinePlus. (2014, September 3). Retrieved 2/10/2014.
<http://www.nlm.nih.gov/medlineplus/raynauds/disease.htm>
7. US Army PHC Cold Weather Injury Prevention webpage –
<http://phc.armdd.army.mil/topics/discond/cip/Pages/ColdCasualtiesInjuries.aspx>
8. FM 4-25.11 First Aid
9. Maign, RJ and Griffin J. Caffeine Ingestion and Fluid balance: a review. JHumNutrDietet. 2003. 16:411-420.
10. Grandjean AC et al. The Effect of Caffeinated, Non-Caffeinated, caloric and Non-Caloric Beverages on Hydration. JAmColNut 2000. 19, No 5. 591-600.



8.20 Indoor Air Quality Management

Not applicable based on current scope of work.

8.21 Mold Remediation Plan

Not applicable based on current scope of work.

8.22 Chromium Exposure Evaluation

Although not expected, when heavy equipment is involved, there is the possibility of repairs requiring welding for terrestrial equipment. Welding operations conducted on stainless steel may generate chromium fumes. In the event it is necessary to conduct welding on stainless steel, work will be conducted outdoors or ventilation, such as local exhaust ventilation will be provided to adequately remove fume from the operator's breathing zone.

SDSs will be obtained for items containing Portland Cement, to determine levels of hexavalent chromium. Additionally, dust control methods will be implemented and personal protective equipment may be utilized when handling Portland Cement, as specified in the AHA, to prevent contact/inhalation.

8.23 Crystalline Silica Monitoring Plan

There may be operations that could present occupational exposures of personnel to respirable crystalline silica above the ACGIH TLV of 25 micrograms (μg)/meter (m)³ (ACGIH, 2017). These operations likely include:

- Excavation and movement of sand.
- Building concrete slab demolition

Exposure Control Plan

Sub-contractors will be required to comply with EFS's plan, or provide their own internal plan, for approval, prior to beginning activities that may generate crystalline silica.

Both the exposure control methods and alternative exposure control methods identified in 29 CFR 1926.1153 Table 1, will be used at the project, to control employee exposures to respirable crystalline silica.

Exposure Control Methods - Removing Concrete

The exposure control methods identified in 29 CFR 1926.1153, Table 1, "Specified Exposure Control Methods When Working with Materials Containing Crystalline Silica", will be used when removing concrete.

When implementing the control measures specified in 29 CFR 1926.1153, Table 1, the following additional requirements are applicable:



- For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust.
- For measures implemented that include an enclosed cab, ensure that the enclosed cab:
 - Is maintained as free as practicable from settled dust
 - Has door seals and closing mechanisms that work properly
 - Has gaskets and seals that are in good condition and working properly
 - Is under positive pressure maintained through continuous delivery of fresh air
 - Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 micrometer (μm) range.
 - Has heating and cooling capabilities

Engineering and Work Practice Control Methods – Removing Concrete

The engineering and work practice control methods identified in 29 CFR 1926.1153, Table 1, will be used when cutting concrete pavement using a walk-behind saw:

- Use saw equipped with integrated water delivery system that continuously feeds water to the blade.
- Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.

Exposure Controls: - Cutting Concrete-Outdoors

Employees will implement use of water or vacuum systems to control visible dust when cutting concrete.

Alternative Exposure Control Methods

The Alternative Exposure Control Methods identified in 29 CFR 1926.1153 will be used for the following operations, which are not described in Table 1:

- Mixing grouts and concrete

Exposure Assessment

An exposure assessment may be made to assess the 8-hour TWA exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the OSHA Action Level and ACGIH TLV of $25 \mu\text{g}/\text{m}^3$ (ACGIH, 2017). Personal air sampling will be performed in the breathing zones of personnel engaged in these operations. A minimum of three full-shift time-weighted average samples will be obtained during each operation for each job classification during representative exposures. Personal air samples will include the workers who have the highest potential for exposure.

Air samples will be collected and analyzed following NIOSH (2003) Method 7500, *Silica, Crystalline, by XRD* using personal air sampling pumps (Gilian GilAir-5[®] or equivalent). Sampling for respirable crystalline silica will continue as determined by the Program Health and Safety Manager. Results of analysis will be incorporated into required air monitoring reports.



Engineering and Work Practice Control Methods

The engineering and work practice control methods identified for these tasks include:

- Use water spray/mist when feasible.
- Work from upwind direction.
- Preferentially use materials that contain lower percentages of silica and are formulated for reduced dusting.

Housekeeping

The housekeeping procedures to be used for reducing employee exposure to respirable crystalline silica include:

- Dry sweeping or dry brushing is not allowed when respirable crystalline silica is present. Use wet sweeping and HEPA-filtered vacuuming when feasible.
- Do not use compressed air to clean clothing or surfaces when respirable crystalline silica is present.

Work Area Access Control

Work area will be isolated to control access.

Competent Person

The SSHO is the designated competent person. The competent person is responsible for making frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

Communication of Respirable Crystalline Silica Hazards to Employees

EFS addresses respirable crystalline silica in the Hazard Communication Program. Each employee must have access to labels on containers of crystalline silica and the safety data sheets. At a minimum, the following respirable crystalline silica hazards are to be communicated to employees:

- Cancer
- Lung effects
- Immune system effects
- Kidney effects

Employee Information and Training

All workers potentially exposed to silica will be trained. The training shall include the following information:

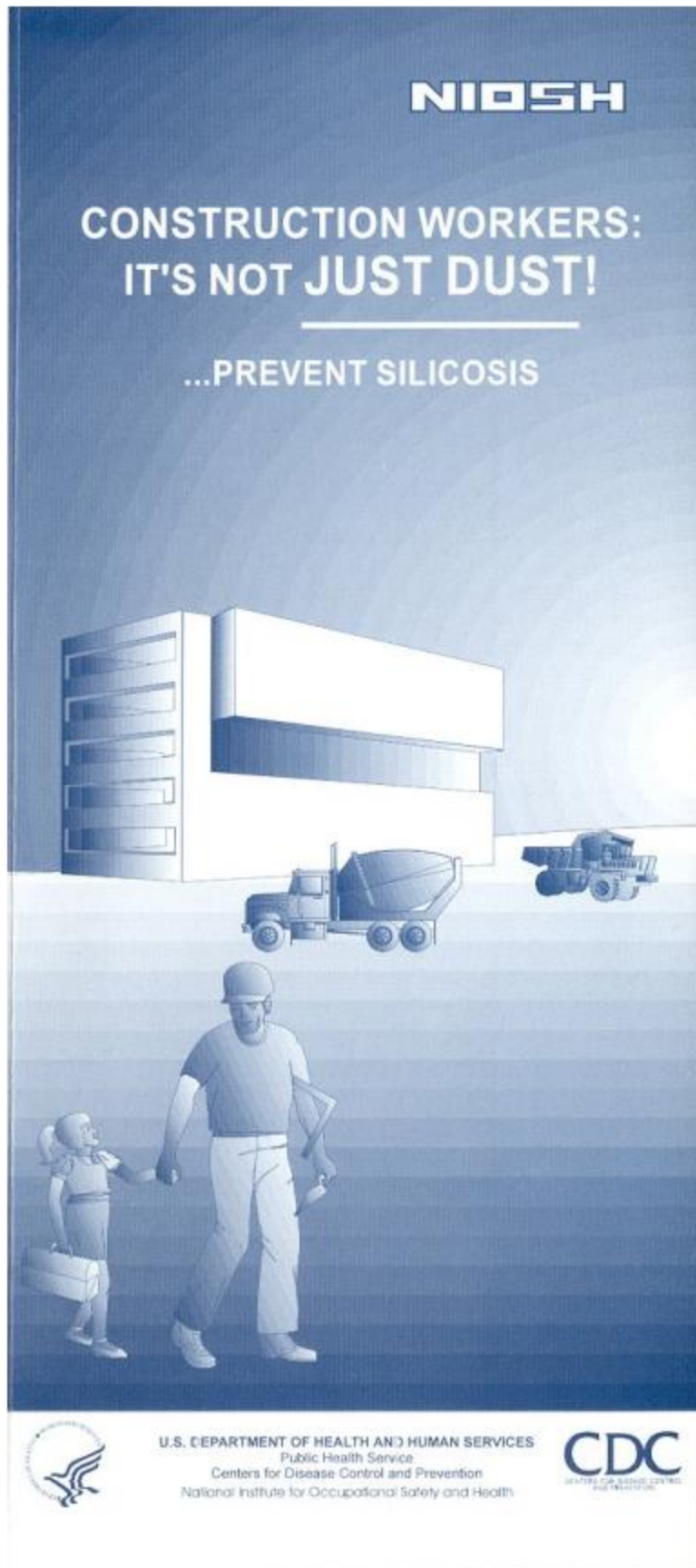
- The health hazards associated with exposure to respirable crystalline silica.
- Specific work tasks that could result in exposure to respirable crystalline silica.



- Specific measures EFS has implemented to protect employees from exposure to respirable crystalline silica will include engineering controls and work practices, such as working upwind, utilizing vacuums, and application of water spray.
- The contents of the OSHA respirable crystalline silica standard (29 CFR 1926.1153).
- Methods for limiting silica exposure.
- The identity of the competent person.

Recordkeeping

An accurate record of all exposure measurements taken to assess employee exposure to respirable crystalline silica will be made and maintained as required by OSHA.





risk of other diseases such as tuberculosis (TB)

HOW IS SILICOSIS PREVENTED?

The key to silicosis prevention is to prevent dust from being in the air. The Occupational Safety and Health Administration (OSHA) requires dust to be controlled whenever possible. A simple control may work.

Example: A water hose to wet dust down at the point of generation. Here are some steps you can take to protect yourself:

- Always use the dust control system and keep it in good maintenance.
- When sawing concrete or masonry use saws that provide water to the blade.
- During rock drilling use water through the drill stem to reduce the amount of dust in the air.
- Use dust collection systems which are available for many types of dust generating equipment. Use local exhaust ventilation to prevent dust from being released into the air.
- Minimize exposures to nearby workers by using good work practices.
- Use abrasives containing less than 1% crystalline silica during abrasive blasting to prevent harmful quartz dust from being released in the air.
- Measure dust levels in the air.

Respirators should only be used until adequate dust controls are in place. Respirators should not be the primary method of protection. If controls cannot keep dust levels below the NIOSH Recommended Exposure Level (REL) then respirators should be used. Select respirators that provide enough protection. Keeping respirators fit for use requires continual maintenance. When respirators are used, OSHA requires employers to establish a comprehensive respiratory protection program. Respiratory protection programs are outlined in the NIOSH *Guide to Industrial Respiratory Protection*.

MEDICAL EXAMINATIONS:

- All workers breathing crystalline silica dust should have a medical examination.
- Chest X-ray (classified according to the 1980 International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses).
- Pulmonary function test.
- Annual evaluation for TB (tuberculosis).

WANT MORE INFORMATION?

Three NIOSH Silicosis Alerts available:

- *Preventing Silicosis and Deaths in Construction Workers*
- *Preventing Silicosis and Deaths from Sandblasting*
- *Preventing Silicosis and Deaths in Rock Drillers*

For free copies call NIOSH at 1-800-35-NIOSH

Your Comments

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in controlling exposures of construction workers to respirable crystalline silica. The need is urgent to inform construction workers, coworkers, and construction managers about the respiratory hazards associated with respirable crystalline silica.

Your comments on how best to inform construction workers about this preventable disease are welcomed. Please send your comments to:

Ken Linch
Industrial Hygienist
NIOSH
Division of Respiratory Disease Studies
1095 Willowdale Road
Morgantown, West Virginia 26505-2888



8.24 Night Operations Lighting Plan

Since work may be conducted during nighttime hours, work during hours of partial or total darkness may be required. All areas where work is underway shall be illuminated by means of existing or temporary lights which shall provide an intensity equal to or greater than 20 foot-candles (Lumens per square foot). This lighting is intended to allow proper execution of the work and to provide a safe working environment for project personnel. Temporary lighting will include telescoping light towers powered by generators. If needed, supplemental lighting will be provided on heavy equipment and machinery in order to provide the necessary intensity required by the specification and to facilitate performance of the particular activity. The lighting sources may include, but not limited to mercury vapor, metal halide, high/low pressure sodium, fluorescent, LED, and incandescent fixtures. Adequate lighting shall be provided to perform all activities in a safe manner. When work is performed before sunrise, after sunset, inside buildings, or within other structures, the minimum lighting requirements specified in **Table 7-1** of the *Safety and Health Requirements Manual* (USACE, 2014) shall be provided.

8.25 Traffic Control

Where it is necessary to work adjacent to or in a public roadway there is a potential struck-by exposure to personnel. To minimize the risk of a struck-by the following will be implemented whenever personnel are exposed to vehicular traffic.

Traffic will be controlled at the site through conventional accepted methods which may include signage, Flag Persons, or Police Officer's as required. A Traffic Control Plan will be developed when work involves diverting traffic around workers. The DOT Manual of Uniform Traffic Control Devices (MUTCD) as referenced in USACE Safety & Health Manual 385-1-1 will be referenced in preparing the traffic control plan. For this project, the Traffic Control Plan will be included in the Site Operations Plan. Provisions for pedestrian worker safety will be provided to prevent struck-by incidents with vehicular traffic. It will also be stressed that employees shall not approach vehicular traffic before making eye contact with the operator. The use of barriers and administrative controls will be utilized.

Work conducted adjacent to railroad tracks, or work that may require access to the railway's right of way, will be coordinated with the railroad.

8.26 Fire Prevention Plan

Scope

This Plan applies to all activities, including subcontractor activities for the project identified above.

List of Major Workplace Hazards

On this project, the major workplace fire hazards will include:

- Normal combustibles including site temporary offices, other buildings, trash, construction materials, vegetation and waste piles. Good housekeeping will be maintained. Trash will



be collected daily and placed in a designated receptacle. Vegetation will be cleared within 3 ft of site trailers and permanent facilities, and within 25 ft of any area storing liquid petroleum gas.

- Combustible and flammable liquids used as fuels in site vehicles, mobile construction equipment and power tools.
 - Gasoline will be kept in labeled 5-gallon metal safety cans with flame arrestor and spring-loaded lid, or in Underwriters Laboratories (UL) approved 1 – 2 gallon plastic cans.
 - Diesel fuel will be kept in labeled UL approved containers.
 - A temporary Diesel fuel tank will be protected with barriers and secondary containment.
 - The refueling area is shown on the Site Layout Plan, **Figure 2-3**

Control of Ignition Sources

- Smoking is prohibited inside vehicles and buildings. A designated smoking area will be established during mobilization and supplied with a self-extinguishing ash tray stand. The smoking area will be coordinated with the site owner.
- Temporary fuel storage tanks will be protected from accidental impact by vehicles and equipment.
- Storage tanks will be double-walled or have other secondary containment measures which will have a capacity of at least the tank volume + 10%. Secondary containment will be inspected regularly and kept free of accumulation of liquids, including rainwater to ensure sufficient free board at all times.
- Tanks, pumps and hoses will be rated/approved and listed for the service and will include appropriate bonding to control static sparks.
- Hose nozzles used to fill equipment from the temporary tank will be automatic closing and will not be equipped with a latch-open device. All filling and transfer operations will be attended.
- Normal combustibles, including high vegetation will be kept at least 25 feet from the refueling area.
- Sources of ignition will be prohibited within 25 feet of the refueling area.
- Equipment with small engines will not be fueled while hot.
- The refueling area will be posted with signs, including “No Smoking”, “No Hot Work”, and “Do not fuel hot equipment.”
- A Fire Extinguisher rated at least 40 B:C will be placed in a fixed and visibly labeled location within 100 feet of the refueling area.
- Tanks will have appropriate hazard warning labels.



- A spill kit suitable for minor spills and leaks of petroleum products will be stationed at the refueling area.
- The refueling area, equipment and emergency supplies will be inspected weekly.
- Small portable containers of flammable liquids will be stored out of direct sunlight and in a designated location. A Flammable liquid storage cabinet will be used if more than two containers of flammable liquids are stored on site. The cabinet will include a “No Smoking” label.

Types of Fire Suppression Equipment

Portable fire extinguishers will be selected and distributed as follows:

- Fire extinguishers rated to 1-A:10-B:C or higher, will be in all the on-site trailers, all work vehicles, mobile construction equipment, and in the immediate vicinity of stored flammable materials.
- 20-B:C extinguisher on any tank truck or pickup with Department of Transportation certified tanks used for fuel dispensing.
- 40-B:C extinguisher in the refueling area.
- 4-A: 60-B:C (10 lb. agent minimum) at each hot work location.
- In buildings under construction, alteration or demolition, at least one 4-A:60-B:C extinguisher will be located per every 6,000 square feet of floor space, on each floor. Extinguishers shall not require a travel distance of more than 75 ft., and one extinguisher on each floor should be placed close to the stairways. Note: If unusual fire hazards exist, consult National Fire Protection Association 10 for additional selection and distribution information.
- For building alteration and demolition projects, fixed fire detection and suppression systems shall remain active for as long as possible.
- The equipment will not be removed except for inspection and/or use in an emergency.
- The SSHO will provide training on the use of the fire extinguisher during the pre-entry briefing, during the site orientation.
- Fire extinguishers will be visually inspected on a monthly schedule.

Schedule for Maintaining Systems and Equipment

The SSHO and Site Superintendent will be responsible for inspection of work areas on a daily basis, and inspection of fire extinguishers on a monthly basis.

Fixed systems in buildings under construction, alteration or demolition will be inspected by, or under the direction of the Authority Having Jurisdiction.

Personnel Responsible for Controlling Fuel Source Hazards

The Site Superintendent is responsible for controlling fuel source hazards, in accordance with this Plan. This includes regular inspections of areas and equipment, maintaining adequate freeboard in



secondary containment, limiting combustibles around fuel storage and dispensing operations, and ensuring control of ignition sources in these areas.

Housekeeping Procedures

Trash will not be permitted to accumulate. Receptacles with lids or roll off boxes will be used to contain trash. Work areas will be cleaned up each day, as often as necessary to maintain a safe job site.

Waste piles will be limited in size, segregated and removed from site as soon as possible.

Spills of flammable and combustible materials will be contained and cleaned up as soon as possible.

Hot Work Permits

Hot work is defined as any process that produces open flames, heat or sparks, including, but not limited to burning, cutting, welding, soldering, brazing, torch applied roofing, and the use of temporary heating devices involving an open flame or exposed heating elements.

Before any hot work is performed, a permit is required. Personnel shall obtain a permit from EFS. A hot work site shall have a designated fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to the fire extinguisher located at each hot work site (a portable fire extinguisher (A:B:C) will be readily available). The fire watch shall remain at his/her designated watch for 60 minutes from the conclusion of hot work activities.

It is the responsibility of the SSHO/Site Superintendent to work with the fire department, to establish the requirements for hot work. A copy of the permit is included in **Appendix C**, Section 2.

8.27 Wild Land Fire Management Plan

Not applicable based on current SOW.

8.28 Arc Flash Hazard Analysis

Not applicable under the current SOW.

8.29 Assured Equipment Grounding Program

Ground-Fault Circuit-Interrupter protection shall be provided on all circuits serving extension cords, temporary lighting, portable electric hand tools and semi-portable electric power tools in lieu of an Assured Equipment Grounding Conductor Program.

8.30 Hazardous Energy Control Plan

Control of hazardous energy may be necessary for the maintenance or repair of mechanical equipment, during start-up phases after renovations are complete, or during set-up of temporary facilities.



A written Lock-out/Tag-out/Try-out Plan will be prepared for the control of hazardous energy, when necessary, to prevent the possibility of incidents to employees when performing work activities on or around hazardous energy sources. This procedural requirement applies to all equipment, vehicles, processes, or systems that are powered by electrical, mechanical, hydrostatic, or pneumatic energy. Employees shall not be allowed to work on energized systems or equipment without authorization.

8.31 Standard Pre-lift Plan: Load Handling Equipment

Rigging and lifting of equipment and materials using Load Handling Equipment (LHE) is anticipated for project activities, except for cranes, which will not likely be used. Rigging and lifting using LHE must be performed in compliance with Section 15 of EM 385-1-1 (USACE, 2014), and Section 16 of EM 385-1-1 (USACE, 2014). Load tests are part of the pre-lift crane procedures when cranes are used. Routine lift plans must be submitted and accepted by USACE, prior to performing the lift.

An EFS, or subcontracted, Competent Person for Crane and Rigging must be on-site to provide oversight for all lifting and rigging operations. The competent person will be identified on the AHA and qualifications submitted with the AHA.

Certification of Compliance for LHE

USACE Form 16-1, "Certificate of Compliance (COC) for LHE and Rigging" must be completed and signed by the Competent Person for Crane and Rigging for each piece of LHE prior to being brought on site. All operators will be duly trained, licensed and certified.

The COC states that the LHE and the rigging equipment meet applicable regulations (to include inspections and tests) as required by the manufacturers and the requirements of this manual.

The COC shall be posted in the cab of the LHE.

Rigging and Lifting with Mobile Cranes

Lift plans for mobile crane operations may be required for portions of this SOW. If necessary, the plan will be developed and submitted under a separate cover.

Rigging and Lifting with Hydraulic Construction Equipment

Hydraulic construction equipment may be used to hoist and transport loads. Operations involving the use of hydraulic construction equipment to lift and transport loads require different operator skills and considerations than the routine excavating and loading operations. Hydraulic excavating equipment may only be used to lift and/or transport loads if allowed by the equipment manufacturer. The equipment manufacturer's lifting procedures must be available on site and followed for these operations to be allowed.

When hydraulic construction equipment is to be used to lift and transport loads utilizing hooks, eyes, slings, chains, or other rigging, the following requirements shall apply:



- Written proof of qualifications of equipment operators, riggers, and others involved in the transporting and hoisting operations
- Performance of the operational test described in EM 385-1-1 (USACE, 2014)
- Proper operating procedures in accordance with the equipment manufacturer's operating manual
- Proper use and on-site availability of manufacturer's load rating capacities or charts
- Proper use of rigging, including positive latching devices to secure the load and rigging
- Inspection of rigging
- Use of tag lines to control the load
- Communication procedures established
- Establishment of a sufficient swing radius (equipment, rigging, and load)
- Stability of surfaces beneath the hydraulic excavating equipment verified
 - The routine lift plan must be completed by the lift supervisor prior to performing the lift.
 - All rigging and rigging operations shall comply with the requirements of Section 15 of EM 385-1-1 (USACE, 2014). Hooks, eyes, slings, chains, or other rigging shall not be attached to or hung from the teeth of a bucket during the transporting or hoisting of a load by hydraulic excavating equipment. Rigging shall be inspected, maintained, and used in accordance with the requirements of EM 385-1-1 (USACE, 2014). Monthly rigging inspections shall be documented. Pre-operational inspections of the rigging elements shall be performed each shift by the competent person. Prior to the specific activity or task, documentation of rigger qualifications shall be provided upon request to the GDA.
 - The use and maintenance of rigging equipment shall be in accordance with recommendations of the rigging manufacturer and the equipment manufacturer. Rigging equipment shall be inspected as specified by the manufacturer, by a competent person, before use on each shift and as necessary during its use to verify that it is safe. The inspection is to verify the rigging is free from defects and rated for the lift weight.
 - The use and practice of rigging include the following:
 - Rigging found to be unsafe or defective shall be tagged and taken out of service.
 - Rigging equipment shall not be loaded in excess of its recommended rated capacity.
 - Rigging equipment, when not in use, shall be removed from the immediate work area and properly stored and maintained in a safe condition. Hooks, shackles, rings, pad eyes, and other fittings that show excessive wear or that have been bent, twisted, or otherwise damaged shall be removed from service.
 - An operational test with the selected hydraulic equipment, described in Section 16.S.05 (b) of EM 385-1-1 (USACE, 2014), will be performed in the presence of the GDA if available. The operational test shall consist of a demonstration that the test load and selected rigging



can be safely lifted, maneuvered, controlled, stopped, and landed. The operational test shall be representative of the complete cycle of the proposed transporting or hoisting operation, including configuration, orientation, and positioning of the excavating equipment and the use of identical rigging. The test load shall be equivalent to the maximum anticipated load but, shall not exceed 100 percent of the manufacturer's load rating capacity for the excavating equipment as configured. Written documentation of the performance of the operational test outlining test procedures and results is provided on the Lift Plan Worksheet (Hydraulic Equipment) and shall be maintained in the on-site project files. This operational test shall also be performed if repairs, major maintenance, or reconfigurations are completed on the hydraulic excavating equipment or attachments.

- Loads shall not be lifted over personnel.
- Adequate clearances shall be maintained from energized power lines.
- Hydraulic excavating equipment shall not be used to hoist personnel. The riding of personnel on loads, hooks, hammers, buckets, or other hydraulic excavating equipment attachment is prohibited.
- Hooks, eyes, slings, chains or other rigging shall not be attached to or hung from the teeth of a bucket during the transporting or hoisting of a load by hydraulic excavating equipment

8.32 Critical Lift Plan

Not applicable, critical lifts are not anticipated under the current SOW, as defined in Section 16.H of the *Safety and Health Requirements Manual* (USACE, 2014).

8.33 Naval Architectural Analysis-Load Handling Equipment (Floating)

Not applicable under current SOW.

8.34 Floating Plant Inspection and Certification

Not applicable under the current SOW.

8.35 Severe Weather Plan for Marine Activities

Not applicable under the current SOW.

8.36 Emergency Plan for Marine Activities

Not applicable under the current SOW.

8.37 Man Overboard/Abandon Ship Procedures

Not applicable under the current SOW.



8.38 Float Plan for Launches, Motorboats, and Skiffs

Not applicable under the current SOW.

8.39 Contingency Plan for Severe Weather (General)

Pre-planning

The SSHO will monitor the weather at least twice daily. Weather monitoring will become continuous if and when the National Weather Service issues a severe weather Watch or Warning.

Recognition and Reporting

A Watch means that a weather emergency is possible. It means Be Prepared. On issuance of a Watch, the SSHO and Emergency Coordinator will determine what site preparations will be made to secure the site, shut down, evacuate or call off a scheduled work shift.

A Warning means that a weather emergency is in the area. It means Take Action. Upon issuance of a Warning, the Emergency Coordinator will implement emergency shut down procedures.

Actions

1. Thunderstorm, Lightning, Tornado
 - a. Remove loose or stacked materials from roofs, or open floor decks.
 - b. Remove from site or secure stacks of materials at ground level.
 - c. Lightning - Stop outdoor activities involving load handling equipment, roofing, working on elevating platforms and scaffolds, tree trimming, or work in open areas upon hearing thunder or seeing lightning. Seek indoor shelter. Stay indoors for 30 minutes after the last audible thunder or visible flash of light.
 - d. Proceed to pre-determined tornado shelter upon issuance of a Warning. The tornado shelter(s) on this project are the office location (Support Zone) or other nearby sturdy building structure.
2. Flood
 - a. If a flood warning is issued, secure site and shut down operations, or cancel work shift if during off-hours.
 - b. Proceed to high ground. Remind workers “Turn around, Don’t Drown” when encountering flooded road conditions.
3. Winter Storm
 - a. Off hours
 - Weather will be monitored for winter storms by the SSHO and Emergency Coordinator, who will determine whether work will proceed on the next scheduled shift.
 - If work is postponed, the client and subcontractor points of contact will be notified.



- The Emergency Coordinator will make arrangements for clearing site access, parking areas and walking paths prior to commencement of normal work activities.
- b. During shift
 - The site will be secured. Based on the weather advisories, the remainder of the work shift may be canceled in time to give workers a chance to travel home before becoming stranded in the storm.
- 4. Heat
 - a. The SSHO will monitor 5 and 10 day forecasts and discuss heat stress awareness at daily tailgates.
 - b. Prepare the site by having emergency cooling provisions in site (shade, water, ice, air conditioning).
 - c. Consider suspending or rescheduling outdoor activities requiring impermeable PPE to cooler times.
 - d. Implement the Heat Stress Monitoring Plan attached to this APP.
- 5. Earthquake
 - a. Earthquakes are unpredictable. If an earthquake happens during working hours on-site, follow these tips from the American Red Cross:

If You are Inside When the Shaking Starts:

- Drop, cover and hold on. Move as little as possible.
- If you are in bed, stay there, curl up and hold on. Protect your head with a pillow.
- Stay away from windows to avoid being injured by shattered glass.
- Stay indoors until the shaking stops and you are sure it is safe to exit. When it is, use stairs rather than the elevator in case there are aftershocks, power outages or other damage.
- Be aware that fire alarms and sprinkler systems frequently go off in buildings during an earthquake, even if there is no fire.

If You are Outside When the Shaking Starts:

- Find a clear spot (away from buildings, power lines, trees, streetlights) and drop to the ground. Stay there until the shaking stops.
- If you are in a vehicle, pull over to a clear location and stop. Avoid bridges, overpasses and power lines if possible. Stay inside with your seatbelt fastened until the shaking stops. Then, drive carefully, avoiding bridges and ramps that may have been damaged.
- If a power line falls on your vehicle, do not get out. Wait for assistance.



- If you are in a mountainous area or near unstable slopes or cliffs, be alert for falling rocks and other debris. Landslides are often triggered by earthquakes.

8.40 Site Specific Fall Protection Plan

This Plan is intended to provide general requirements. Site specific plans will be developed depending on tasks associated with each project. Fall protection may be required for certain activities. If this occurs, the appropriate fall protection plan will be developed in accordance with ECC EHS-SOP.02-05..

- Duties and responsibilities. This Plan will identify Competent and Qualified Persons for fall protection as well as their responsibilities and qualifications.
- Description of the project or task to be performed.
- Training requirements to include the safe use of fall protection equipment.
- Anticipated hazards and fall hazard prevention and control.
- Rescue Plan and procedures
- Design of anchorages/fall arrest and horizontal lifeline systems.

Note: The AHA may be used in lieu of the Form as long as it provides the details required by the Form.

Duties and Responsibilities

The Competent and Qualified Persons for fall protection on this project will be listed on the Site-Specific Fall Protection Plan form for each activity requiring fall protection.

General Requirements

Policies

Fall prevention or protection measures will be implemented whenever employees are exposed to falls of more than six feet or onto hazardous equipment or obstructions, regardless of the phase of construction or activity. Platforms, including scaffolds, 4 ft to 6 ft in height, having a minimum horizontal dimension in either direction of less than 45 inches, shall have standard railings installed on all open sides and ends of the platform or the workers shall use personal fall protection.

Fall prevention and protection measures may be required by the SSHO if fall hazards not covered by this plan are exacerbated by specific conditions, such as reduced platform width, fall hazard behind the person or other hazards.

Stairways, ladders, or ramps must be provided at access points where there is a break in elevation of 19 inches or more, and no runway, sloped embankment, or personnel hoist is provided.

Generally, stairways are preferred over ladders as means to access different levels, particularly in long-term use.



Ladders should not be used as work platforms at elevations over 6 feet. Scaffolds, including elevating work platforms, should be considered whenever feasible.

A Competent Person must be designated to oversee the erection, dismantling and inspections of all scaffolds.

All scaffolds must be erected and used in compliance with OSHA standards and manufacturer's instructions, and on federal government projects, with EM 385-1-1.

Anticipated Hazards and Fall Hazard Protection and Control

Anticipated fall hazards from elevations would be associated with use of mobile elevating work platforms / articulating boom lifts. Fall protection associated with this equipment will be addressed in the AHA for the task. Qualified operators of this equipment will be required to utilize fall arrest devices, attached to the lift anchor point, in accordance with manufacturer recommendations and EM 385 1-1 requirements.

Fall hazards will be assessed on an ongoing basis and addressed during the preparatory phase for each DFOV and will be addressed in the AHA or on the completed Site- Specific Fall Protection Plan.

Control Hierarchy

Whenever feasible, standard guardrails will be used to prevent falls from elevations. If the use of guardrails is not feasible, then EFS and its subcontractors will use safety nets, restraint systems, personal fall arrest systems, or warning lines and safety monitors.

Inspections

End users will inspect all equipment and facilities used that could present or is meant to control a fall hazard on a daily basis, prior to use and during the work period as conditions may change. This includes but is not limited to:

- Walking/working surfaces
- Ladders, stairs and access ramps
- Scaffolds
- Aerial Work Platforms (AWPs)
- Personal fall arrest systems (PFAS) and positioning devices including harness, lanyard and anchor points

The Competent Person will inspect and tag scaffolds daily. A Competent Person will conduct periodic inspections of PFAS at least semiannually.

The SSHO will evaluate the effectiveness of the program through daily inspections of activities at elevation. The Safety and Health Manager will review activities at elevation during periodic site inspections.



Incident Investigations

All incidents involving actual or potential falls from height will be investigated in accordance with the Mishap Reporting and Investigation procedures in Section 7.11 of the APP.

Rescue Plan and Procedures

Rescue procedures for workers at elevations will be included in the AHA or the completed Site-Specific Fall Protection Plan Form.

Design of Anchorages/Fall Arrest and Horizontal Lifeline Systems

Details of the anchorages and fall arrest system will be included in the AHA or the completed Site Specific Fall Protection Plan Form. These details may include copies of vendor data or the qualified persons' designs and instructions.

Other Guidelines for Fall Protection

Standard guardrail, catch platforms, temporary floors, safety nets, personal fall protection devices, or the equivalent, shall be used to protect site personnel in the following situations:

- Access ways (excluding ladders) or work platforms from which they may fall 6 ft or more
- Access ways or work platforms over water, machinery, or dangerous operations
- Runways, from which they may fall 1.2 m (4 ft) or more

Platforms, including scaffolds, 4 ft to 6 ft in height, having a minimum horizontal dimension in either direction of less than 45 inches, shall have standard railing installed on all open sides and ends of the platform or the workers shall use personal fall protection.

Personal fall protection devices will be required any time personnel are working from a work platform that is not protected by standard guardrails and are exposed to falls from a height of 6 ft or more.

Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as follows:

- As part of a complete personal fall arrest system which maintains a safety factor of at least two
- Under the supervision of a qualified person

PFAS(s), when stopping a fall, shall:

- Limit maximum arresting force on an employee to 1,800 lb. (820 kg) when used with a body harness
- Be rigged such that an employee can neither free fall more than 6 ft (1.8 m) nor contact any lower level or other physical hazard



- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 ft (1 m)
- Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 ft (1.8 m) or the free fall distance permitted by the system, whichever is less

Positioning device systems shall:

- Be rigged such that an employee cannot free fall more than 2 ft (0.6 m)
- Be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 lb. (1360 kg), whichever is greater

Additionally, the following requirements for full-body harnesses shall be met:

- Harnesses shall have two lanyards when necessary to ensure that a person is tied-off with at least one lanyard at all times.
- The manufacturer's recommendations shall be followed in the fitting, adjustment, use, inspection, testing, and care of personal fall protection equipment: before an employee uses personal fall protection equipment, he/she shall receive instruction in these recommendations and the potential fall hazards of the activity.
- Personal fall protection equipment shall be inspected before use each day to determine that it is in safe working condition: defective equipment shall be immediately replaced.

Personal fall protection equipment shall be used only for the purpose of safeguarding employees as intended by the manufacturer. Any such equipment subjected to impact loading shall be immediately removed from service and shall not be used again for employee safeguarding.

Appropriate protection (such as warning signs, flags, tape, or barricades) shall be provided to prevent personnel, vehicles, and equipment from falling into excavations.

Other Guidelines for Scaffolding

Scaffolds will be designed by a Qualified Person. Design information, or manufacturer's instructions will be provided to EFS and maintained on site.

Scaffold erection and dismantling will take place under the supervision of a Competent Person who has been trained and provided proof of training., who has selected and trained the workers involved. Fall protection will be used unless the Competent Person documents that it is not feasible, or a greater hazard.

The load capacities will not be exceeded. Scaffold platforms will be fully decked and provided with standard guardrails. Scaffolds will be level, plumb, properly braced, and secured against tipping and falling in accordance with OSHA and manufacturer's requirements.

Scaffolds will be inspected and tagged on a daily basis by the Competent Person.



Safe access to work platforms will be provided in the form of ladders or stair towers. Stair towers will have stair rails on all open sides.

Employees working from scaffolding should observe the following rules:

- Inspect the scaffold prior to using it every day for each shift, as applicable.
- Maintain three points of contact when climbing ladders.
- Never climb on the scaffold braces. Climb end frames, only when they are designed as access ladders.
- Hoist materials up after reaching work platforms.
- Remove slippery substances from hands, feet and scaffolds. Remove trip hazards; do not allow debris to accumulate on platforms.
- Secure all gates, chain rails, etc.
- Don't use ladders or other things on the platform to increase your working height.
- Don't use red-tagged or untagged scaffolds. If using a yellow-tagged scaffold, follow instructions on the tag.
- Don't throw or drop things from the scaffold.
- Use side brackets for personnel only, not for loading materials.
- Lock wheels on mobile scaffolds.
- Do not move mobile scaffolds with people standing on the platform. Descend and push unoccupied scaffold into place.

(Note): Mobile scaffolds may be moved with personnel on the platform, only if the height is no more than twice the minimum base dimension; the platform is level within 3°; there is a guardrail around the platform; occupants are warned before moving; and movement is by pushing from near the bottom, no higher than 5 feet from the surface.)

- Do not load scaffolds in excess of their rated capacity. Do not point load scaffold – distribute the weight.
- Maintain a safe distance – at least 10 feet - from all power lines.
- Use tag lines to control loads near scaffolding.
- Protect support ropes of suspended scaffold from damage, corrosive materials, and heat producing processes, such as welding and cutting.
- Do not work on scaffolds in storms or high winds unless the Competent Person has determined it is safe to do so.

Training

A Training Program will be implemented by a Competent Person who is qualified in delivering fall protection training for site workers working at heights.

Training will be verified by a written certification record identifying the worker trained, the dates of the training and the signature of the trainee and the trainer. Retraining shall be conducted as necessary for workers to maintain an understanding of fall protection.



Training will include:

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used
- The application limits, freefall distance, total fall distance and clearance requirements of fall protection systems and equipment
- Rescue equipment and procedures
- Hands-on training and practical demonstrations as needed of:
 - guardrail systems
 - personal fall arrest systems
 - safety net systems
 - warning line systems
- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection
- The role of employees in fall protection plans
- All applicable requirements in EM 385-1-1 Section 21
- The OSHA standards for fall protection
- This Plan

Fall Prevention and Protection Plan (Sample)

Project Name:	Project Number:
Activity:	Competent Person: (Attach qualifications)
Subcontractor:	
Description of Fall Hazards (location, height, work to be done at elevation, etc.)	
Controls (check items that apply) <input type="checkbox"/> Guardrails (Describe guardrail system or attach drawings. If fall protection is needed during installation, describe) <input type="checkbox"/> Fall Restraint (Describe anchorage, harness and restraint lanyard, minimum distance from edge of fall exposure) <input type="checkbox"/> Positioning device (Describe anchorage, harness and restraint lanyards and hardware connectors) <input type="checkbox"/> Personal Fall Arrest System (Describe anchorage, lanyard, harness, fall clearance) <input type="checkbox"/> Do anchor points need to be installed? <input type="checkbox"/> No	Provide details. Attach drawings, catalog sheets, additional pages as needed.



<input type="checkbox"/> Yes (Provide design details and fall protection method for installers)	
<input type="checkbox"/> Horizontal Lifeline (Attach Qualified Engineer Design)	
<input type="checkbox"/> Vertical Lifelines, Rope Grabs (Provide details and limitations on use)	
Rescue Plan (Describe how you will remove a suspended or injured worker from elevations, rescue equipment to be maintained on site, expected time required to affect rescue)	
All employees of (company name)_____ have been trained on this plan and on the selection, use, inspection and maintenance of fall protection equipment.	
Competent Person Signature:	Date:

8.41 Demolition Plan

Not applicable under current SOW.

8.42 Rope Access Work Plan

Not applicable under current SOW.

8.43 Excavation and Trenching Plan

Excavation plans, in addition to an AHA will be completed for all excavations or trenches greater than 5 feet in depth. Excavations less than 5 feet, require an AHA, and the excavation plan is optional. General requirements are provided below. The Excavation Daily Inspection and Soils classifications forms are located in Appendix C, Section 3. The inspections will be conducted once before excavation commencement, more frequently during work as required, after changes are noticed and after events that occur that increase hazards per EM 385-1-1 25.A.O2a. The permit will be renewed prior to the requirements of the 811 agency.

- (a) Excavations that may exceed 4 feet in depth require personnel to adhere to the requirements of EM 385 1-1 and 29 CFR 1926.

Additionally, prior to conducting any excavation activities, utility locates must be conducted. Professional locators must be utilized. EFS is also required to contact any applicable local utility locating services by contacting 811.



- (b) Egress points must be within 25 ft. of personnel, so at least every 50 ft. Ladders must extend from bottom of excavation to 3 ft. above surface. Ramps for personnel access must be a minimum of 4 ft. wide and have standard guardrails – see Section 21.F.01 of EM 385-1-1. Ramps for equipment must be at least 12 ft. wide and curbs of not less than 8x8” timbers. Equipment ramps must be designed and constructed in accordance with accepted engineering practice. In addition to the access/egress the AHA must provide the proper Perimeter Protection Class per definitions in Appendix Q of EM 385-1-1 and provide the acceptable controls according to Section 25.B of EM 385-1-1]
- (c) CP must be able to demonstrate:
- (1) Training, experience, and knowledge of soil analysis, use of protective systems, and requirements of this Section and 29 CFR 1926 Subpart P;
 - (2) Ability to detect conditions that could result in cave-ins, failures in protective systems, hazardous atmospheres, and other hazards including those associated with confined spaces; and
 - (3) The authority to take prompt corrective measures to eliminate existing and predictable hazards and stop work when required.
- (d) The CP will conduct inspections daily, and as conditions change, and provide documentation that examination of the ground by the CP provides no indication of a potential cave-in. Daily inspections by CP will be recorded on EFS Form ESQ-7.7.01

Rescue Plan

A rescue plan will be provided, as applicable, for each separate location.

Diagram of Excavation Area

Diagrams will be provided, as applicable, for each location, and will provide the following:

- Location and extent of excavation
- Structures or trees within excavation to be removed
- Structures, trees or other features adjacent to excavation to be protected and preserved
- Expected Underground utility locations and locations of shut offs
- Nearby Overhead power lines
- Access to excavation area, and protective systems around perimeter of excavation
- Access/egress points to excavation
- Expected depths of excavation

Projected Maximum Depth(s)

Maximum depths will be provided for each specific project, where applicable.

Projected Soil Type and Method of Testing to Determine Soil Type

Soil shall be evaluated and classified by the Competent Person. The classifications will in accordance with OSHA 1926 Subpart P, App. A as stable rock, type A, B, or C soil. Classifications



shall be made using at least one visual and one manual analysis identified in 1926 Subpart P, App. A.

It is anticipated all soil will be classified as Type C.

In layered soil systems, the system shall be classified according to its weakest layer. However, each layer may be classified individually where a more stable layer exists under a weaker layer.

In the event the properties, factors, or conditions affecting classification change, the system shall be reevaluated by the Competent Person. Reclassify as necessary to reflect the changed circumstances.

Soil Classification will be documented using the Soil Classification Form.

Protective Systems

It is anticipated excavations will be benched. In the event benching is not possible, alternate methods including sloping or trench boxes, will be utilized.

Trench Access and Egress

Trenches in excess of 4 feet deep require a minimum of 2 means of egress. The AHA and drawing for each location, where applicable, will address locations.

Atmospheric Monitoring

In the event there is potential for sources of toxic gases, such as exhaust from nearby combustion engines, to enter the excavation, monitoring will be conducted. Monitoring in general would consist of a multi-gas detector, to check for oxygen, Carbon monoxide, and explosive gases.

For entry into excavations, excavations will be tested at the beginning of each shift and routinely throughout the day during remedial activity utilizing a multi-Rae PGM 6228 PID, or similar, to test for VOCs, H₂S, O₂, CO and LEL.

Action levels are as follows:

VOCs: >1 ppm above background, sustained for 5 minutes=stop work and contact SHM for evaluation.

H₂S: >5 ppm, stop work, ventilate, and contact SHM

Oxygen: < 19.5 or > 23.5%= stop work, contact SHM for evaluation

LEL: >10%= stop work, ventilate, and contact SHM

CO: > 25 ppm, stop work, ventilate, and contact SHM

Location of Utility Shut Offs

Utilities connected to drainage lines will be blocked and locked out. Other utilities that may affect work will be evaluated at each location and measures will be taken to control associated hazardous energy.



Damage Prevention

For all adjacent structures that pose a hazard to workers or potential damage incidents, precautions shall be established per OSHA 29CFR1926.651(i). Sidewalks, pavements and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

Management of Excavated Soil, Asphalt, Concrete

Excavated materials will be kept a minimum of two feet from the edge of all excavations to avoid falling into excavation or creating a hazardous surcharge on excavation faces.

Traffic Control Plan

In areas where activities are adjacent to roadways, traffic controls will be implemented accordingly, based on the requirements of EM 385 1-1.

Digging Permits

Prior to excavation work being performed, utilities must be located in accordance with Standard Operating Procedures for Underground Utility Avoidance. All utility locates shall be performed a minimum of two days in advance of any excavation work being performed. Private locating services will be utilized as well.

A “Digging Permit” must be obtained from the authority having jurisdiction (AHJ) by calling 811.

8.44 Emergency Rescue-Tunneling

Not applicable under the current SOW.

8.45 Underground Construction Fire Prevention and Protection Plan

Not applicable under the current SOW.

8.46 Compressed Air Plan

Not applicable under the current SOW.

8.47 Formwork and Shoring Erection and Removal Plan

Not applicable based on current SOW.

8.48 Precast Concrete Plan

Not applicable based on current SOW.



8.49 Lift Slab Plan

Not applicable based on current SOW.

8.50 Masonry Bracing Plan

Not applicable under current SOW.

8.51 Steel Erection Plan

Not applicable under current SOW.

8.52 Explosives Safety Site Plan

Not applicable under current SOW.

8.53 Blasting Safety Plan

Not applicable under current SOW.

8.54 Diving Plan

Not applicable under current SOW.

8.55 Safe Practices Manual for Diving Activities

Not applicable under current SOW.

8.56 Emergency Management Plan for Diving

Not applicable under current SOW.

8.57 Tree Felling and Maintenance

Not applicable under current SOW. No tree felling is anticipated, only clearing and grubbing of shrubs and heavy brush will be required.

8.58 Aircraft / Airfield Construction Safety and Phasing Plan

Not applicable under current SOW.

8.59 Aircraft / Airfield Safety Plan Compliance Document

Not applicable under current SOW.

8.60 Site Safety and Health Plan

See **Appendix F** for the SSHP.



8.61 Confined Space Program

Based on the current SOW, we do not anticipate confined spaces. However, larger tanks are needed to contain/treat water, such as the use of a frac tank that requires cleaning internally, it would be considered a confined space entry. Entry into a confined space, if required, will be conducted in accordance with 29 CFR 1910.146 and EM 385 1-1 Section 34. A confined space is defined as a space large enough and configured so that an employee can bodily enter and perform assigned work, has limited means for entry or exit, and is not designed for continuous employee occupancy. Confined space work may pose additional hazards such as chemical exposures, flammable/explosive atmospheres, electrocution, oxygen deficiency, etc. A “Danger – Permit Required Confined Space, Do Not Enter” sign shall be used to identify a confined space and is to remain at the entrance to the confined space.

Personnel shall never enter a confined space without a permit issued by the SSHO. If personnel are uncertain about whether their activity involves a confined space entry, they shall stop work and notify their supervisor or the SSHO.

Employees who are required to enter a confined space, will be trained in accordance with applicable OSHA regulations, and EM 385 1-1 requirements. Only properly trained personnel shall supervise and participate in confined space entry procedures or serve as standby attendants. Employees (entrants, attendant, rescuers, supervisors, monitoring/evaluating personnel, etc.) shall be trained in aspects of the written plan that affect them. Each employee shall be trained before initial assignment, prior to a change in assigned duties, if a new hazard has been created, or if special deviations have occurred. The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this practice.

Personnel shall never enter a confined space without a hazard assessment being performed by the Construction Manager/SSHO. Before entry, all confined spaces shall be considered permit-required confined spaces. A Non-permit confined space means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. A permit-required confined space may be re-classified as a non-permit, confined space if protective measures have been implemented that alter the space so that the space no longer contains or possesses the ability to contain an atmosphere capable of causing death or physical harm. The SSHO must approve the reclassification of the space. Only the Construction Manager/SSHO may downgrade a permit-required confined space to a non-permit-required confined space. Confined space entry permits are good for one shift maximum of a shift of 12 hours only.

Confined Space Entry Competent Person

The Construction Manager/SSHO is the designated Confined Space Entry Supervisor/Competent Person for this project. The Competent Person’s responsibilities include identifying and labeling all permit-required confined spaces, developing the site-specific confined space entry program,



developing and enforcing all confined space entry permits, and coordinating with local emergency responders to verify their rescue capabilities. Otherwise, rescue services will be developed on site.

Elements of the Confined Space Entry Program

In the event confined spaces are encountered, a plan will be developed and submitted, prior to entry.

The site-specific confined space entry program shall include detailed procedures regarding safe entry conditions including, but not limited to, the following:

- Developing and maintaining entry permits
- Determining acceptable entry conditions
- Observing the monitoring or testing in the confined space (completed by the authorized entrant)
- Isolating the confined space
- Ventilating the confined space as necessary to control atmospheric hazards
- Maintaining and properly calibrating combustible gas/oxygen meters
- Monitoring to verify acceptable entry conditions for the duration of the authorized entry.

Confined Space Entry Equipment

The following equipment shall be used as part of the confined space entry program:

- Atmospheric testing and monitoring equipment capable of testing the confined space atmosphere for
 - oxygen (O₂),
 - combustible gases and vapors relative to the Lower Explosive Limit (LEL) and
 - toxic gases as well as carbon monoxide (CO).
- Examples of this equipment may include the following:
 - 4-gas meter (O₂, LEL, CO, toxic gas)
 - Photoionization detector equipped with 10.6-electron volt lamp
 - Colorimetric detector tubes and manual pump
- Ventilation equipment to ensure maintenance of safe entry conditions (explosion-proof electrically operated or air-driven with nonferrous fan blades)
- Communication equipment for entry
- Required PPE – Levels based on the results of the atmospheric monitoring
- Lighting equipment – Underwriters Laboratories 844, Electric Lighting Fixtures for Use in Hazardous (Classified) Locations - explosion-proof, minimum 540 lux (50 foot-candle), floodlight type, or Mine Safety and Health Administration (MSHA) approved, explosion-proof, portable battery-powered light
- Ladders or other equipment as necessary for entrant access/egress
- Rescue and emergency equipment



The Confined Space Entry Competent Person shall be familiar with all confined space entry equipment including maintenance and procedures for use.

Atmospheric Testing and Air Monitoring Action Levels

Prior to entering a confined space, the atmosphere will be tested, parameters based on the potential contamination present, as well as oxygen levels, explosive vapors, and carbon monoxide, at a minimum.

Oxygen >19.5% and <23.5%
LEL < 10%;
CO < 25.0 ppm

If tests indicate that the atmosphere is unsafe, the confined space shall be ventilated until the hazardous atmosphere is removed and before employee entry. The ventilation required shall be noted on the permit.

For non-permitted spaces, there may be no hazardous atmosphere within the space whenever any employee is inside. (**Exception:** In emergency maintenance/rescue situations, the atmosphere shall be considered as an immediately dangerous to life or health condition, and appropriate protective measures shall be taken, and applicable PPE worn).

The atmosphere within the space shall be periodically tested as necessary (minimally every 4 hours) to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.

If after ventilating the space tests indicate a hazardous atmosphere, work will stop, and no person will be allowed to enter until a plan to adequately protect employees is developed and implemented.

Unexpected instrument readings at or above action levels generally warrant the following:

- All personnel will stop work in the area, exit the work area, and assemble upwind
- Additional monitoring shall be performed to substantiate previous readings
- If previous readings are substantiated, engineering controls, such as increasing ventilation, shall be implemented to maintain air quality within specified levels.

If engineering controls, such as increased ventilation, cannot maintain atmospheres to within acceptable qualities, then the Health and Safety Manager shall be contacted prior to continuing work activities.

ECC SOP O4-01 for confined spaces is included in **Appendix B**.

8.62 COVID Protection Protocol

Due to the dynamic nature of COVID protective measures, EFS employees and subcontractors will adhere to current CDC and local requirements.



9.0 RISK MANAGEMENT PROCESSES

Established SOPs will be utilized to assist in the identification and implementation of appropriate hazard control measures. The Table of Contents for these SOPs is presented in **Appendix B**. SOPs may be referenced throughout the APP and its attachments, appendices and supplemental plans. All SOPs are readily available to EFS employees through the company intranet, referred to as ECCONET.

9.1 Activity Hazard Analyses – Policy and Procedure

Major activities to be performed will be covered in an AHA. Craft labor involvement in AHA development will be encouraged. All personnel involved in a task will review the AHA before performing the task. This review will be appropriately documented. Upon commencement and throughout the activity, the AHA will be used to verify compliance with the prescribed hazard controls and to note any potential changes in process and, therefore, potential hazards.

AHA's will be written prior to the start of a particular DFOV and presented to the field crews prior to initiating field work. Some AHAs are included in this APP, however for those not included, they will be incrementally developed prior to the task taking place in the field. All affected personnel will be trained to that particular AHA. If the SOW changes, or if alternate or improved methods and/or equipment are determined during the project, additional AHA's may be generated and added to **Appendix A**.

AHA's applicable to potential project activities include:

- Mobilization and site preparation
- Air monitoring
- Clearing and Grubbing
- Subsurface investigations of data gaps for improved characterization of excavation areas
- Monitoring, Sampling, Testing, and Analysis of various media, including soil, water, and debris
- As-required demolition of pavement and building slabs/foundations
- Excavation and management for off-site disposal of impacted soils
- T&D of FUSRAP contaminated soils and debris
- Confined space entry
- Equipment Decontamination
- Groundwater collection and containment
- Stockpile management
- Operation of on-site temporary water treatment process for potentially impacted groundwater and construction-generated water
- Groundwater monitoring well decommissioning and installation of new wells
- Backfill and site restoration; and
- Demobilization



10.0 AWARENESS AND COMMUNICATION

Hazard awareness and communication is an important part of project safety program. The following sections describe awareness and communication efforts to be implemented.

10.1 Accident Prevention Signs, Tags, and Labels

Standard accident prevention signs, tags, and labels will be used to communicate hazards and precautions in accordance with EM 385-1-1, Section 08.A. Examples that may be used include:

- A project sign, including running injury-free record;
- Danger, Warning, and Caution signs;
- Work zone and PPE requirement signs;
- Lockout/tag out tags;
- Inspection and Do Not Use tags; and
- National Fire Protection Association or Hazardous Materials Identification System signs and labels.

Specific items will be determined by the SSHO.

10.2 Daily Safety Briefings

Daily briefings are used to communicate daily activities, hazards, and precautions, as well as to solicit input from site project personnel and visitors on safety issues or improvements. The briefings may also be used to present safety training topics and refresher items.

10.3 Site Orientation

All site personnel will be required to go through an initial site orientation prior to the start of their field work. Site Orientation shall include at a minimum, but not limited to:

- Review of the hazards;
- Emergency procedures (medical, fire);
- Minimum basic PPE;
- Incident reporting;
- Accident prevention; and
- Review of applicable AHA's;
- APP training and acknowledgment.

10.4 General Site Rules

The following site rules are applicable to all EFS projects:

- Eat, drink, use gum or tobacco products, or apply cosmetics in designated areas only.
- Do not smoke within site areas or near flammable or combustible materials; areas shall be marked where smoking is permitted.



- Use the buddy system when working in Exclusion Zones. Know who your buddy is, communicate regularly with each other and be alert to signs of distress in your buddy.
- Wash hands, face, and any exposed skin during decontamination, before eating, drinking or using tobacco products, and at the end of each shift.
- Participate in Daily Safety Tailgate Meetings.
- Continually observe work location and be alert to changes that may affect safety.
- Avoid direct contact with contamination by not purposefully walking, touching, or contacting any obviously contaminated surfaces.
- Immediately report any mishaps, including near misses, or unusual situations to SSHO.
- Use PPE provided and as instructed by the SSHO.
- Avoid hand-to-mouth or hand-to-face activities.
- Testing and monitoring instruments, safety equipment, rigging, hand and power tools, vehicles and mobile construction equipment shall be inspected prior to use.
- Minimize the number of personnel in a work area to reduce potential exposures.
- Work within physical and mental limits.
- Take adequate rest breaks and replace body fluids (water and electrolyte) continuously.
- At all times follow the instructions of the SSHO or designee.
- Do not deviate from the APP or the instruction of the SSHO.
- Avoid rushing and/or taking short cuts.
- Handle and dispose all waste generated from decontamination procedures per contract requirements.
- Conduct visual checks on machinery and equipment prior to use and complete the daily inspection form.
- Take precautions to prevent spillage and splashing; contain spilled liquid if possible.
- Alert your senses to potentially dangerous situations (e.g., strong, irritating, or nauseating odors).
- Familiarize yourself with the physical characteristics of the site.
- Dispose of all wastes generated during activities as directed by the Supervisor, SSHO or designee.
- Sign in/out on daily site employee/visitor accountability log



This page intentionally left blank.

Appendix A
Activity Hazard Analyses

This page intentionally left blank.

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK:	Mobilization and Preparatory Work	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Prime Contractor:	Enviro-Fix Solutions LLC	Activity #		AHA #	1		
PROJECT NAME:	Former Harshaw Chemical Company	Risk Assessment Code (RAC) Matrix					
PROJECT LOCATION	Cleveland, Ohio						
CONTRACT NUMBER:	W912P424C0002	Severity	Probability				
ECC PROJECT NUMBER:	5024.000		Frequent	Likely	Occasional	Seldom	Unlikely
PRIME CONTRACTOR REVIEWED BY:							
SSHO:	Yong McGuire						
QCM:	Shouvik Gangopadhyay						
Superintendent:	TBD	Catastrophic	E	E	H	H	M
Subcontractor:	Various	Critical	E	H	H	M	L
AHA Prepared By:	Kym Edelman, CIH, CSP	Marginal	H	M	M	L	L
AHA Reviewed By:	Kym Edelman, CIH, CSP	Negligible	M	L	L	L	L
		Review each "Hazard" with identified safety "Controls" and determine (RAC)					
E = EXTREMELY HIGH (PWO/OICC/ROICC)		Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard". Place the highest RAC at the top of AHA. This is the overall risk assessment code for this activity					
H = HIGH RISK (FEAD DIRECTOR)		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible after controls are in place "Probability" is the likelihood to cause an incident, near miss, or accident did occur and identified as: Frequent, Likely, Occasional, Seldom, or Unlikely after controls are put in place.					
M = MODERATE RISK (CM or ET or PAR)							
L = LOW RISK (ET or PAR)							

PRINCIPAL STEPS	POTENTIAL SAFETY/ HEALTH HAZARDS	RECOMMENDED CONTROLS	RAC
Site Mobilization of subcontractor personnel to the project site	Vehicular/Vendor traffic accident	<ul style="list-style-type: none"> Operate vehicles at the appropriate speed based on the weather conditions Observe all posted vehicular traffic rules on the active military installation Use spotters when backing up construction Vehicles Class 2 high-visibility safety vests meeting ANSI/ISEA 107-2020 standards shall be used at all times while working on this active military installation 	L
	Equipment striking personnel or other equipment	<ul style="list-style-type: none"> Construction equipment storage areas will be established on even, flat terrain. 	L

Activity/Phase of Work: Mobilization and Preparatory Work	Project No.: 5024.000	Page 7
Project/Location: Harshaw, Cleveland, OH	Contract No: W912P424C0002	

PRINCIPAL STEPS	POTENTIAL SAFETY/ HEALTH HAZARDS	RECOMMENDED CONTROLS	RAC
Mobilization of equipment and materials to the job site.	Slip, trip or fall while unloading heavy or irregularly shaped equipment and/or materials.	<ul style="list-style-type: none"> Equipment and materials will be driven as close as possible to the material lay down/storage area to prevent personnel from carrying cumbersome loads long distances. Material lay down area will be established on even, flat Terrain. 	L
	Struck by falling object.	<ul style="list-style-type: none"> Access/egress to material lay down areas shall be kept safe and orderly to minimize slip, trip and fall hazard potentials. Hard hats meeting ANSI Z89.1-2014 standards shall be always worn during unloading of materials and supplies. All materials will be securely stored prior to transportation to prevent shifting within the mobilization vehicles. Protective-toe boots meeting ASTM F2412-18 and F2413-18 shall be worn at all times. 	L
	Material in eye	<ul style="list-style-type: none"> Safety glasses meeting ANSI Z87.1-2020 standards shall be worn at all times during unloading of materials/supplies. 	L
	Strain from lifting.	<ul style="list-style-type: none"> Use of mechanical devices will be the first option considered on all appropriate lifting tasks. Site personnel will be instructed in the use of proper lifting techniques, including ending at the knees, avoiding twisting motions while lifting, and holding loads close to the body while lifting and carrying. 50 lb. limit. 	M
	Struck by moving heavy equipment and other vehicles	<ul style="list-style-type: none"> Ensure spotter for delivery truck stays in line-of-sight of driver at all times. High-Visibility vest or jacket will be worn. 	M
	Struck by hand tools, e.g. hammering in anchors and ground rods	<ul style="list-style-type: none"> <u>All employees handling sharp materials or tools (including knives) will wear cut-resistant gloves (i.e. Kevlar, Dyneema, etc.) with a cut resistance level (ANSI/ISEA) of 4 or 5).</u> Safety glasses, hard hats, safety-toe footwear will be worn. Keep hands out of pinch points. 	L M
PRINCIPAL STEPS	POTENTIAL SAFETY/	RECOMMENDED CONTROLS	RAC

Activity/Phase of Work: Mobilization and Preparatory Work	Project No.: 5024.000	Page 7
Project/Location: Harshaw, Cleveland, OH	Contract No: W912P424C0002	

	HEALTH HAZARDS		
Stage equipment on site	Slip, trip or fall while unloading heavy or irregularly shaped equipment and/or materials.	<ul style="list-style-type: none"> Equipment and materials will be driven as close as possible to the material lay down/storage area to prevent personnel from carrying cumbersome loads long distances. 	L
	Struck by falling object.	<ul style="list-style-type: none"> Access/egress to material lay down areas shall be kept safe and orderly to minimize slip, trip and fall hazard potentials. Hard hats meeting ANSI Z89.1-2014 standards shall be worn at all times during unloading of materials and supplies. All materials will be securely stored prior to transportation to prevent shifting within the mobilization vehicles. Protective-toe boots meeting ASTM F2412-18 and F2413-18 shall be worn at all times. 	L
	Material in eye	<ul style="list-style-type: none"> Safety glasses meeting ANSI Z87.1-2020 standards shall be worn at all times during unloading of materials/supplies. 	L
	Strain from lifting	<ul style="list-style-type: none"> Use of mechanical devices will be the first option considered on all appropriate lifting tasks. Site personnel will be instructed in the use of proper lifting techniques, including ending at the knees, avoiding twisting motions while lifting, and holding loads close to the body while lifting and carrying. 	M

Activity/Phase of Work: Mobilization and Preparatory Work	Project No.: 5024.000	Page 7
Project/Location: Harshaw, Cleveland, OH	Contract No: W912P424C0002	

PRINCIPAL STEPS	POTENTIAL SAFETY/ HEALTH HAZARDS	RECOMMENDED CONTROLS	RAC
Load/Unload and store equipment and materials	Slip, trip or fall while unloading heavy or irregularly shaped equipment and/or materials	<ul style="list-style-type: none"> Equipment and materials will be driven as close as possible to the material lay down/storage area to prevent personnel from carrying cumbersome loads long distances. Material lay down area will be established on even, flat Terrain. 	L
	Struck by falling object.	<ul style="list-style-type: none"> Access/egress to material lay down areas shall be kept safe and orderly to minimize slip, trip and fall hazard potentials. Hard hats meeting ANSI Z89.1-2014 standards shall be worn at all times during unloading of materials and supplies. All materials will be securely stored prior to transportation to prevent shifting within the mobilization vehicles. 	L
	Material in eye.	<ul style="list-style-type: none"> Protective-toe boots meeting ASTM F2412-18 and F2413-18 shall be always worn. Safety glasses meeting ANSI Z87.1-2020 standards shall be worn at all times during unloading of materials/supplies. 	L
	Strain from lifting.	<ul style="list-style-type: none"> Use of mechanical devices will be the first option considered on all appropriate lifting tasks. Site personnel will be instructed in the use of proper lifting techniques, including ending at the knees, avoiding twisting motions while lifting, and holding loads close to the body while lifting and carrying. 	M

PRINCIPAL STEPS	POTENTIAL SAFETY/ HEALTH HAZARDS	RECOMMENDED CONTROLS	RAC
Lifting Objects Using Heavy Equipment	Struck by Lifting Equipment and Loads	<ul style="list-style-type: none"> • The operator shall not exceed the load capacity rating for the excavator, cables, hooks, and other lifting items. • Personnel shall never be placed under suspended loads. 1c. Loads shall be lifted to the minimum height necessary to accomplish the task. • Rigging shall be inspected daily by a competent person. 1e. All rigging components shall be labeled with the applicable capacity ratings (including chains). • Hooks shall be equipped with a self-closing safety latch. The crane must be equipped with an anti-two-block device. Functionality will be demonstrated during the inspection. • The hoist cable shall not be wrapped around the load. • One or more tag lines will be utilized to ensure full control of the load. • Lifting equipment shall have a minimum 10 feet clearance from overhead electrical power lines. This distance will increase as the voltage increases per EM 385-1-1, Section 11.F and Table 11-1. • When lifting materials and equipment onto roofs, do not allow boom to contact roof edge. • Maintain good housekeeping in the vicinity of the lift operation to prevent slip, trip, fall hazards. • The swing radius of the lifting equipment will be clearly demarcated so that personnel may stay clear. 	M

PRINCIPAL STEPS	POTENTIAL SAFETY/ HEALTH HAZARDS	RECOMMENDED CONTROLS	RAC
Lifting Objects Using Heavy Equipment (Cont'd)	Contact with Utilities	<ul style="list-style-type: none"> Equipment or personnel will not get closer than 10 feet to an overhead power line. This distance is based on the requirements of EM 385-1-1, Section 11.F (Table 11-1). To determine line voltages, the appropriate utility company must be contacted. If work must be conducted closer to utilities than guidelines allow, or for placement of insulation, the utility company must be contacted. An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the ONLY job the observer is performing when an observer is required. Keep all personnel well away from the equipment whenever it is close to power lines. 	M
Removal/Cleaning of Temporary Structures	Exposure to cleaning/Disinfecting Agents	<ul style="list-style-type: none"> SDSs for all materials used will be present at the site. Elements of SDSs will be reviewed with all personnel <p>prior to use.</p>	M
	Spills	<ul style="list-style-type: none"> Appropriate PPPE will be used based on guidelines of SDS. Spills will be contained/removed in accordance client requirements and recommendations in SDS. 	

Equipment to be Used	Inspection Requirements	Training Requirements/Competent or Qualified Personnel Name(s)
Heavy Equipment Forklift	Initial inspection by SSHO. Notify GDA if requested to do so before inspection. Daily by operator	Only qualified operators permitted to operate. Completely reviewed by Supervisor/SSHO. Licensed where required by state regulations. Provide Certificates for all Competent Person(s) Competent Person Name(s) TBD
Temporary power supplies including GFCI's, extension cords, cord and plug operated tools	Outlets – weekly during site inspection GFCI – weekly during site inspection Extension cords, cords and plugs on equipment – daily by users	General electrical safe work practices training provided during site orientation. Only licensed electricians will install, repair and maintain electrical equipment and current carrying part of electrically-supplied tools and equipment. Provide Certificates for all Competent Person(s) Competent Person Name(s)
PPE	Pre-use by user	Personnel must be trained in proper use and limitations Provide Certificates for all Competent Person(s) Competent Person Name(s)

[illegible]

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK: Air Monitoring		Overall Risk Assessment Code (RAC) (Use highest code)				L		
PROJECT LOCATION: Former Harshaw Chemical Company								
CONTRACT NUMBER: W912P424C0002		Risk Assessment Code (RAC) Matrix						
DATE PREPARED: May 2024		Severity	Probability					
PREPARED BY: (Name/Title): Robert A. Brooks, CSP, STS-C			Frequent	Likely	Occasional	Seldom	Unlikely	
REVIEWED BY: (Name/Title): Kym Edelman, CIH, CSP			Catastrophic	E	E	H	H	M
Notes: (Field Notes, Review Comments, etc.)			Critical	E	H	H	M	L
			Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L	
		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)						
		Probability: likelihood the activity will cause a Mishap (near miss, incident or accident). Identify as Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart		
		Severity: the outcome if a mishap occurred. Identify as Catastrophic, Critical, Marginal, or Negligible.				E = Extremely High Risk		
		Step 2: Identify the RAC (probability vs. severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk		
						M = Moderate Risk		
						L = Low Risk		
Job Steps	Hazards	Controls*					RAC	
Mobilization to site	Vehicle Mishaps Struck-By	<ul style="list-style-type: none"> Wear seat belts while operating vehicle Obey traffic laws, designated speed limits, school zones and traffic zones Comply with ECC Cell Phone Policy Wear Class 2 Hi-Vis safety vests as part of Level D PPE Park vehicle, if possible, in driveway of property If working adjacent to active roadways place traffic cones at front & back of vehicle (approx. 15-ft from vehicle) 					L	
Placing/collecting monitors	Slips / Trips / Falls	<ul style="list-style-type: none"> Be Aware of uneven surfaces while walking. Where there is a visibly apparent basement of wine cellar DO NOT approach the unprotected edge of the area. Stay a minimum of 6-ft away from the unprotected edge. DO NOT walk or stand on any metal or wood object to access areas inside the structures footprint. Inspect work areas when arriving to identify potential hazards. 					L	

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> As much as possible set monitors from the perimeter of the parcel and distribute personnel monitors in the support area. 	
	Struck-By (Unstable structures)	<ul style="list-style-type: none"> Assess condition of vertical structures (i.e., chimney, fireplace, walls) prior to working around them; If unstable DO NOT work around this location – Notify ECC Mgmt. / SSHO 	L
	Exposure to Chemicals (dermal / respiratory)	<ul style="list-style-type: none"> Wear appropriate PPE as indicated in APP/HASP when entering designated work zones. Perform proper donning and doffing of PPE when accessing and exiting the designated WZ All disposable PPE shall be bagged and left inside the WZ at the end of the work day. 	L
	Adverse weather / Temperatures (low) Hypothermia	<ul style="list-style-type: none"> Monitor local media for up-to-date severe weather forecasts. Discontinue work during thunderstorms and severe weather events. Dress accordingly to reduce potential for hypothermia; bring change of clothing if clothing gets wet Hydrate throughout the work day 	L
	Insects, Snakes, Wildlife, Vegetation Exposures	<ul style="list-style-type: none"> Inspect work areas when arriving for site assessment to identify hazard(s) Use insect repellant as necessary Workers with allergies should carry antidote kits, if necessary 	L
Stop work and notify your supervisor if you are not sure how to perform your task safely!			

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements	
Sampling equipment as required by the Radiation Protection Plan.	<ul style="list-style-type: none"> Initial Safety Orientation Daily Safety Tailgate Meetings Emergency Response Plan First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) 	<ul style="list-style-type: none"> PPE Safety Equipment (i.e. sample equipment, eyewash, and first Aid Kits) 	

Activity Hazard Analysis (AHA)

Activity Hazard Analysis Training Log		Activity/Phase of Work: Air Sampling	
<i>By signing below: I agree to follow the work steps and implement the hazard controls. I agree to stop work when conditions or hazards change, when work cannot be performed as written, or when instructions become unclear during execution. I am qualified and fit to perform the work.</i>			
PRINT NAME	SIGNATURE	EMPLOYER	DATE

Training Provided by: _____

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Clearing and Grubbing	Overall Risk Assessment Code (RAC) (Use highest code)					M
Project Location: Former Harshaw Chemical Company	Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002	Severity	Probability				
Date Prepared: March 2024		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert Brooks, CSP, STS-C/Program Health and Safety Manager	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)				
PPE: Level D (hardhat, steel toe boots, work gloves, orange safety vest, hearing protection, and safety glasses). Individual(s) using chain saw will also wear chaps and a mesh face shield.		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk
						M = Moderate Risk
						L = Low Risk

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment	RAC
Mobilization	General Safety	General Safety - To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures, operational aspects & heavy equipment use, and change(s) in site work conditions. Daily housekeeping will be implemented during and at the ends of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit). Drinking water that is stored in a cooler clearly marked "Food & Drink Only – No Samples".	L
Remove Trees and Clear Smaller Trees and Brush	Severe Cuts and Bruises from Chainsaws and Brush Hogs	<ul style="list-style-type: none"> Do not walk with chain engaged. Do not use chainsaws above shoulder. Do not use brush cutters above waist. Hold equipment with both hands during cutting operations. The engine shall be started and operated only when all co-workers are clear of the saw. The operator will shut off chainsaw when carrying it over slippery surfaces. Shoulder harness required for use with brush cutter. Wear ANSI approved hard hats, safety glasses and safety-toe footwear. Use of mesh face shields, chaps, leather gloves and hearing protection will be mandatory for this activity. 	M
Remove Trees and Clear Smaller Trees and Brush	Ticks and other insects	<ul style="list-style-type: none"> Use DEET on exposed skin and Permethrin on clothing especially shoes, gaiters and pant legs. Use gaiters, treated with Permethrin and tuck pant legs into gaiters. 	L
(Continued)	Struck by Flying Debris (for all job steps)	<ul style="list-style-type: none"> Do not operate brush cutter without the debris shield in place and tightly secured. Do not operate the brush cutter without the safety clip in place. Wear safety glasses with side shields and full-face polycarbonate shield. 	L

Activity Hazard Analysis (AHA)

	Burns from Hot Exhausts Fire/Explosion of Gasoline	<ul style="list-style-type: none"> Wear long sleeves and leather gloves. Keep hands away from hot exhaust and engines. Allow equipment to cool before refueling and eliminate other sources of ignition. Use only approved safety cans for gasoline/bar oil. Cleanup spills immediately. 	L
	Scrapes and Cuts	<ul style="list-style-type: none"> Wear safety glasses, gloves and long sleeves. 	L
	Back and/or Leg Strain	<ul style="list-style-type: none"> Maintain manageable loads and stretch prior to work. 	L
	Repetitive Stress Injury	<ul style="list-style-type: none"> Switch equipment from one side to the other, if possible. Take break or switch team positions if musculoskeletal fatigue is noticed. 	L
	Excessive noise exposure (for all job steps)	<ul style="list-style-type: none"> Wear hearing protective devices (Earmuffs/plugs) when working, when using or near high noise producing equipment, or when directed by ECC SSHO or SSHO representative in response to noise monitoring. Ensure adequate maintenance on equipment. Conduct periodic sound level surveys. 	L
	Severe Weather (applies to all job steps)	<ul style="list-style-type: none"> Shut down operations during severe electrical storms, heavy rain, high wind and evacuate site/take cover. Train personnel on Emergencies Response. Monitor weather systems. 	L
	Heat/Cold Stress (applies to all job steps)	<ul style="list-style-type: none"> Rest/work cycles, intake of warm fluids, and temperature monitoring. Proper work clothing. 	L
Chipping Brush	Caught in or between moving machinery parts	<ul style="list-style-type: none"> No loose clothing, gauntlet-type gloves, rings or watches shall be worn by employees operating chippers. Keep all body parts away from throat and discharge of chipper. Chippers shall be equipped with mechanical infeed system or shall have a flexible anti-kickback device installed in the infeed hopper for the purpose of protecting the operator and other persons in the machine area from the hazards of flying chips and debris. Mechanical infeed systems shall have a quick stop and reversing device on the infeed on disk-type tree or brush chippers. The activating mechanism for the quick stop and reversing device shall be located across the top, along each side of, and as close to the feed end of the infeed hopper as possible and within easy reach of the operator. The feed chute or feed table of the chopper shall have sufficient height on its side members to prevent operator contact with the blades or knives during normal operations. Push sticks – of materials which can be consumed by brush chipper - shall be used, if necessary. Shut down machinery and lock out to remove jams or make repairs. 	M
Stop work and notify the Team Leader if you are not sure how to perform your task safely!		Stop work and notify the Team Leader if you are not sure how to perform your task safely!	Stop work and notify the Team Leader if you are not sure how to perform your task safely!
Equipment to be Used		Training Requirements	Inspection Requirements

Activity Hazard Analysis (AHA)

1. Chainsaws
2. Brush cutters
3. Chipper

Support Zone

- Cell phone or Radio communication
- Eyewash station
- Fire extinguishers
- First aid kit
- Drinking water
- 911 Air horn
- Spill containment supplies
- Air Monitoring equipment, if needed
- Emergency decontamination supplies

PPE: Level D (hardhat, reinforced toe boots, work gloves, orange safety vest, hearing protection, and safety glasses). Individual(s) using chain saw will also wear chaps and a mesh face shield.

- Users trained in accordance with manufacturer's training recommendations and operators manuals
- Experience and competency of tree fellers to be verified by SSHO or site superintendent
- Only qualified operators permitted to operate mobile equipment
- First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite)
- Initial Safety Orientation
- Daily Safety Tailgate Meetings
- Emergency Response Plan/Procedures
- Fire extinguishers
- Emergency Response Plan

- SSHO or SSHO representative will perform daily site inspection.
- Equipment - Receipt and inspected by SSHO or site superintendent.
- Competent person will inspect equipment daily prior to each use. No equipment will be placed in service until all deficiencies are corrected.
- Complete ECC daily equipment inspection form.
- Weekly inspection of first aid kits.
- Monthly inspection of fire extinguishers.
- GFCIs (at least monthly).

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Surveys – General Civil, Gamma Walkover, Final Status	Overall Risk Assessment Code (RAC) (Use highest code)					M
Project Location: Former Harshaw Chemical Company	Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002	Severity	Probability				
Date Prepared /Revised: May 2024		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert A Brooks, CSP, STS-C/Program Health and Safety Manager	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
Competent Person (Name/Title):	Negligible	M	L	L	L	L
	Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)					
	“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart	
	“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
Notes: (Field Notes, Review Comments, etc.)	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk	
					M = Moderate Risk	
						L = Low Risk

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment	RAC
General Site Civil Survey (set up survey grid and control, perform survey) and Final Site Survey		General Safety: <ul style="list-style-type: none"> To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & heavy equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled, and avoid pinch point hazards. 	L

Activity Hazard Analysis (AHA)

General Site Civil Survey (set up survey grid and control, perform survey) and Gamma Walkover Survey (continued)			
	Lifting strains and sprains (applies to all job steps)		L
	Awkward body positions and twisting (applies to all job steps)	Plan activity to avoid twisting of body or awkward body positions. Use buddy system or job rotation to reduce exposure to conditions that cannot be avoided.	
	Slips, trips, and falls (applies to all job steps)	<ul style="list-style-type: none"> Wear work boots with lug soles. Maintain awareness of hazards associated with uneven or wet terrain. 	L
	Crush hazard or contact stress to hands/fingers from inserting pins or stakes (applies to all job steps)	<ul style="list-style-type: none"> Wear leather gloves when inserting pins, flagging, or stakes into the ground. Do not hurry task if hammering. 	L
	Struck by vehicle if working in traffic area (applies to all job steps)	<ul style="list-style-type: none"> Establish traffic control and wear a Class II traffic vest if in traffic area. Use vehicles to block work area when practical. 	L
	Biological Hazards (applies to all job steps)	<ul style="list-style-type: none"> All participants will be trained in recognition and avoidance of poisonous plants. If snakes are encountered, the UXOSO will be notified. Wear Permethrin-treated gaiters and tuck pant legs into gaiters. All personnel shall be issued DEET and Permethrin to address possible ticks & chiggers. Individuals will be urged to perform a body check at the end of the workday for ticks. Use DEET on exposed skin, Permethrin on clothing, especially shoes, gaiters and pant legs. Care will be taken to avoid disturbing bee/wasp/hornet nesting areas. If stinging insects are encountered, a long-range aerosol spray will be used to eliminate them. Application of aerosol shall be planned in the AM or late PM part of the day. Any individuals working on this task with a known insect sting allergy MUST notify all task participants of the location of the Epinephrine Pen to be used in the event of anaphylactic shock. 	L
	Repetitive stress from repeated bending or squatting during grid construction (applies to all job steps)	<ul style="list-style-type: none"> Use job rotation when hazard exists, stretch before performing work activity. Use paint device that allows employee to stand up while spraying. 	L
	Chemical exposure from using spray paint (applies to all job steps)	<ul style="list-style-type: none"> Stand up wind of paint spraying activities 	L
	Noise hazards from survey equipment using percussion devices	<ul style="list-style-type: none"> Wear hearing protection, keep unnecessary workers away from devices when activated. 	L

Activity Hazard Analysis (AHA)

	Heat / Cold Stress (applies to all job steps)	<ul style="list-style-type: none"> Monitor weather conditions and implement controls in accordance with Heat/Cold Stress Prevention Plan in APP. Stay hydrated. Stop and rest in cool shaded area if heat strain symptoms occur and when instructed by SSHO. Report all signs and symptoms of heat strain immediately to SSHO. 	L
	Pinch or injury when opening/closing manhole cover	<ul style="list-style-type: none"> Use proper tools to open and utilize help if available. Wear work gloves. 	L
	Repetitive stress injury	<ul style="list-style-type: none"> Stretch affected muscle groups. Shift detection equipment from one arm to the other when fatigued. Take breaks when necessary. 	L
Additional measures for Gamma Walkover Surveys	Radiological and Hazardous Materials Contamination	<ul style="list-style-type: none"> Follow APP Procedures for PPE in the APP and Radiation Protection Procedures as per Appendix H of the APP Radiation Protection Plan. 	M
Stop work and notify the SSHO if you are not sure how to perform your task safely!			
Stop work and notify the SSHO if you are not sure how to perform your task safely!			
Stop work and notify the SSHO if you are not sure how to perform your task safely!			
Equipment to be Used		Training Requirements	Inspection Requirements
<p>Initial PPE will be modified Level D.</p> <p><u>Support Zone</u></p> <ul style="list-style-type: none"> Cell phone or Radio communication Eyewash station Fire extinguishers First aid kit, drinking water 911 Air horn Spill containment supplies Air Monitoring equipment, if needed Emergency decontamination supplies Radiation Detection Instruments <p>PPE: Modified Level D (hardhat, composite toe boots, gaiters as needed, work gloves, orange safety vest, safety glasses, and hearing protection, as needed), unless noted otherwise noted in the APP or RPP.</p>		<ul style="list-style-type: none"> Users trained in accordance with manufacturer's training recommendations and operators manuals. Only qualified operators permitted to operate mobile equipment First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Initial Safety Orientation Daily Safety Tailgate Meetings Emergency Response Plan/Procedures Fire extinguishers Emergency Response Plan <p>Competent Person – SSHO, Radiation Safety Officer</p>	<p>Prior to use, ensure equipment is operational, calibrated according to operating manuals, and performing in accordance with required standards.</p>

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Survey - Civil, Ground Penetrating Radar (GPR)	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: Former Harshaw Chemical Company	Risk Assessment Code (RAC) Matrix	
Contract Number: W912P424C0002	Severity	Probability
Date Prepared /Revised: May 2024		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title): Robert A Brooks, CSP, STS-C/Program Health and Safety Manager	Catastrophic	E E H H M
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director	Critical	E H H M L
	Marginal	H M M L L
Competent Person (Name/Title):	Negligible	M L L L L
	Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)	
Notes: (Field Notes, Review Comments, etc.)	“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	RAC Chart
	“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	E = Extremely High Risk
		H = High Risk
		M = Moderate Risk
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.	L = Low Risk

JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS Consider People, Equipment, Materials and Environment	RAC
Site Survey (set up survey grid and control, perform survey) Use of ground penetrating radar		General Safety: <ul style="list-style-type: none"> To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & heavy equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled and avoid pinch point hazards. 	L
	Lifting strains and sprains (applies to all job steps)		L
	Awkward body positions and twisting (applies to all job steps)	Plan activity to avoid twisting of body or awkward body positions. Use buddy system or job rotation to reduce exposure to conditions that cannot be avoided.	

Activity Hazard Analysis (AHA)

	Slips, trips, and falls (applies to all job steps)	<ul style="list-style-type: none"> Wear work boots with lug soles. Maintain awareness of hazards associated with uneven or wet terrain. 	L
	Crush hazard or contact stress to hands/fingers from inserting pins or stakes (applies to all job steps)	<ul style="list-style-type: none"> Wear leather gloves when inserting pins, flagging, or stakes into the ground. Do not hurry task if hammering. 	L
	Struck by vehicle if working in traffic area (applies to all job steps)	<ul style="list-style-type: none"> Establish traffic control and wear a Class II traffic vest if in traffic area. Use vehicles to block work areas when practical. 	L
	Biological Hazards (applies to all job steps)	<ul style="list-style-type: none"> All participants will be trained in recognition and avoidance of poisonous plants. If snakes are encountered, the SSHO will be notified. Wear Permethrin-treated gaiters and tuck pant legs into gaiters. All personnel shall be issued DEET and Permethrin to address possible ticks & chiggers. Individuals will be urged to perform a body check at the end of the workday for ticks. Use DEET on exposed skin, Permethrin on clothing, especially shoes, gaiters and pant legs. Care will be taken to avoid disturbing bee/wasp/hornet nesting areas. If stinging insects are encountered, a long-range aerosol spray will be used to eliminate them. Application of aerosol shall be planned in the AM or late PM part of the day. Any individuals working on this task with a known insect sting allergy MUST notify all task participants of the location of the Epinephrine Pen to be used in the event of anaphylactic shock. 	L
	Repetitive stress from repeated bending or squatting during grid construction (applies to all job steps)	<ul style="list-style-type: none"> Use job rotation when hazard exists, stretch before performing work activity. Use paint device that allows employee to stand up while spraying. 	L
	Chemical exposure from using spray paint (applies to all job steps)	<ul style="list-style-type: none"> Stand up wind of paint spraying activities 	L
	Noise hazards from survey equipment using percussion devices	<ul style="list-style-type: none"> Wear hearing protection, keep unnecessary workers away from devices when activated. 	L
	Heat / Cold Stress (applies to all job steps)	<ul style="list-style-type: none"> Monitor weather conditions and implement controls in accordance with Heat/Cold Stress Prevention Plan in APP. Stay hydrated. Stop and rest in cool shaded area if heat strain symptoms occur and when instructed by SSHO (Site Safety and Health Officer). Report all signs and symptoms of heat strain immediately to SSHO. 	L
	Pinch or injury when opening/closing utility hole cover	<ul style="list-style-type: none"> Use proper tools to open and utilize help if available. Wear work gloves. 	L

Activity Hazard Analysis (AHA)

	Repetitive stress injury	<ul style="list-style-type: none"> Stretch affected muscle groups. Shift detection equipment from one arm to the other when fatigued. Take breaks when necessary. 	L
Ground Penetrating Radar Survey	Strains/sprains/trips falls Ergonomic hazards	<ul style="list-style-type: none"> Only qualified operators will utilize equipment Transporting the unit to the work location requires lifting, dragging, or carrying the case housing the unit. Use proper lifting technique, and where possible use container wheels to move the case. There is a potential pinch point on the antenna handle during setup. Evaluate area where work is being conducted. Mark or remove tripping hazards There is a potential for tripping when the operator is walking and viewing console during measurement. Use caution and be careful of divots, holes, or other uneven surfaces. Push rather than pull equipment over surfaces, to reduce potential strains. If equipment gets into awkward areas, obtain help maneuvering, to avoid strains/sprains and other ergonomic hazards 	M
	Overexertion/heat stress	<ul style="list-style-type: none"> Take frequent breaks when working in conditions where temperatures become warm and when utilizing PPE, that may prevent air flow, which inhibits the body from cooling' Drink plenty of water, even when not thirsty, to prevent dehydration. 	
Stop work and notify the SSHO if you are not sure how to perform your task safely!		Stop work and notify the SSHO if you are not sure how to perform your task safely!	Stop work and notify the SSHO if you are not sure how to perform your task safely!
Equipment to be Used		Training Requirements	Inspection Requirements
<p>Initial PPE will be modified Level D.</p> <p><u>Support Zone</u></p> <ul style="list-style-type: none"> Cell phone or Radio communication Eyewash station (Portable) Fire extinguisher First aid kit Drinking water 911 Air horn Spill containment supplies Air Monitoring equipment, if needed Survey instruments – Civil, GPS <p>PPE: Modified Level D (hardhat, composite toe boots, gaiters as needed, work gloves, orange safety vest, safety glasses, and hearing protection, as needed), unless noted otherwise in this AHA</p>		<ul style="list-style-type: none"> Users trained in accordance with manufacturer's training recommendations and operators manuals Only qualified operators permitted to operate mobile equipment First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Initial Safety Orientation Daily Safety Tailgate Meetings Emergency Response Plan/Procedures Fire extinguishers Emergency Response Plan 	<p>Before use, ensure equipment is operational, calibrated according to operating manuals, and performing according to required standards.</p>

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK: Erosion Control / Storm Water BMP Installation		Overall Risk Assessment Code (RAC) (Use highest code)				M		
PROJECT LOCATION: Former Harshaw Chemical Company								
CONTRACT NUMBER: W912P424C0002		Risk Assessment Code (RAC) Matrix						
DATE PREPARED: MAY 2024		Severity	Probability					
PREPARED BY: (Name/Title): Robert A. Brooks, CSP, STS-C/Program Health and Safety Manager			Frequent	Likely	Occasional	Seldom	Unlikely	
REVIEWED BY: (Name/Title): Kym Edelman, CIH, CSP/Corporate Health and Safety Director			Catastrophic	E	E	H	H	M
Notes: (Field Notes, Review Comments, etc.)			Critical	E	H	H	M	L
			Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L	
Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) Probability: likelihood the activity will cause a Mishap (near miss, incident or accident). Identify as Frequent, Likely, Occasional, Seldom or Unlikely. Severity: the outcome if a mishap occurred. Identify as Catastrophic, Critical, Marginal, or Negligible. Step 2: Identify the RAC (probability vs. severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.								
		RAC Chart						
		E = Extremely High Risk						
		H = High Risk						
		M = Moderate Risk						
		L = Low Risk						

Job Steps	Hazards	Controls*	RAC
Mobilization of people, equipment, tools, and material	Struck-by, property damage, vehicle collision	<ul style="list-style-type: none"> Deploy spotter where required, especially in narrow and congested area. If there is exposure to traffic use a trained flagger. Drive slowly and observe the posted speed limit on ROW. Survey area and barricade potential struck-against conditions. Machinery or equipment shall not be operated in a manner that will endanger persons or property. All vehicles must be operated by licensed drivers. Inspect vehicles prior to operation. Daily Inspections of all equipment to be carried out and documented. A backup warning system with backup lights and warning alarm will be in good working condition on all vehicles and equipment. If a lane or partial lane closure is necessary, a traffic control zone shall be established with signage and flaggers in accordance with the APP. A lead or back-up vehicles with 	L

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> amber flashing lights and emergency blinkers may be used for moving operations It is strictly prohibited for any person to position themselves on the back of pick-up truck or rack truck while in transport 	
	Struck-by falling materials or equipment parts	<ul style="list-style-type: none"> Secure all materials (i.e., straw bales) and tools prior to transporting on to and between parcels All articulating parts on the straw blower unit shall be secured from inadvertent rotation 	L
	Caught-in between	<ul style="list-style-type: none"> Personnel shall remain safe distance while towing vehicle positions to connect with trailer No personnel shall be located between the trailer and towing vehicle while moving 	L
	Overexertion	<ul style="list-style-type: none"> Proper lifting techniques shall be followed when lifting bales of straw. Utilize two hands, bends knees, support bale on thighs. DO NOT toss bales overhead 	L
	Cuts / Lacerations	<ul style="list-style-type: none"> DO NOT utilize utility knives to cut twine on straw bales; utilize snips or similar hand tool 	L
	Struck-by – moving parts	<ul style="list-style-type: none"> A safe zone and radius shall be established prior to engaging equipment. This safe area shall be demarcated using cones and caution tape. All moving sections of the equipment shall be secured from inadvertent movement prior to transporting to new parcel locations 	L
	Struck-by POV's other equipment / trucks	<ul style="list-style-type: none"> Deploy spotter where required, especially in narrow and congested area. If there is exposure to traffic use a trained flagger. Drive slowly and observe posted speed limit on ROW. Survey area and barricade potential struck-against conditions Machinery or equipment shall not be operated in a manner that will endanger persons or property. All vehicles must be operated by licensed drivers. Inspect vehicles prior to operation. Daily Inspections of all equipment to be carried out and documented. A backup warning system with backup lights and warning alarm will be in good working condition on all vehicles and equipment. 	L

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> If a lane or partial lane closure is necessary a traffic control zone shall be established with signage and flaggers in accordance with the APP. A lead or back-up vehicles with amber flashing lights and emergency blinkers may be used for moving operations It is strictly prohibited for any person to position themselves on the back of pick-up truck or rack truck while in transport 	
	Operating equipment in an unsafe manner	<ul style="list-style-type: none"> Equipment operator shall be trained on, familiar with, and qualified to operator the Straw Blower 260B. Employer shall provide documentation that identified the operator as qualified for this specific equipment Operator shall go all pre-operation checks, as per the manufacturer's recommendation Equipment be operated based on the manufacturer's parameters. Operator shall not exceed safe operating guidelines established by the manufacturer 	L
	Amputation	<ul style="list-style-type: none"> All crew members (i.e., operator, bale handlers, driver) shall be trained in their responsibilities and be familiar with their task during this operation At no time shall any assigned worker place any appendage in areas of the equipment where it is clearly identified as being an amputation hazard The equipment operator is fully responsible for the safe operation of the equipment including all crew members 	M
	Falls	<ul style="list-style-type: none"> Equipment operator shall maintain three points of contact while accessing and descending from the operators seat / controls Jumping up onto or down from equipment is strictly prohibited 	L
	Excessive Sound Levels	<ul style="list-style-type: none"> All workers assigned to this task shall wear hearing protection when working directly for or adjacent to the operation 	L
	Struck-by flying pieces of straw	<ul style="list-style-type: none"> All personnel shall wear safety glasses No personnel shall place themselves within in front of the deployment chute Operator shall notify all support personnel w/ horn prior to engaging equipment 	L
	Exposure to airborne nuisance dust	<ul style="list-style-type: none"> Personnel shall be afforded respiratory protection whether half-face negative pressure or N95 disposable respirators 	L

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
	Fire	<ul style="list-style-type: none"> All refueling shall be performed via field supervisors fuel pod on truck or designated refueling truck A 10B:C fire extinguisher shall be on the equipment and fueling vehicle Equipment shall be shut down at time of refueling 	L
	Overexertion	<ul style="list-style-type: none"> Proper lifting techniques shall be followed when lifting bales of straw. Utilize two hands, bends knees, support bale on thighs. DO NOT toss bales overhead 	L
Deployment of Waddles <ul style="list-style-type: none"> Off-loading of waddles Handling / placement of waddles Securing waddles (stakes) 	Overexertion	<ul style="list-style-type: none"> Proper ergonomic techniques shall be followed when lifting & moving waddles. Utilize two hands, bends knees, use two (2) workers to move long waddles into position 	L
	Struck-by falling materials	<ul style="list-style-type: none"> Material and tools to be properly secured while transporting to site. Proper cargo tie-down straps to be used to secure loads to transport vehicles. Plastic wrapping of waddles on pallets shall not be removed until removed from transport vehicle. Remove plastic wrapping when on ground All ground personnel shall remain at a safe distance during loading / unloading of pallets of waddles from delivery vehicles Only qualified forklift operators (i.e., certification) shall be permitted to operate Lull or equivalent lifting equipment Wear safety boots giving adequate toe protection and appropriate PPE as per ANSI standards. 	L
	Caught-in between	<ul style="list-style-type: none"> Personnel shall maintain safe distance from transport vehicle during loading / off-loading of palletized waddles Personnel shall avoid positioning themselves between a forklift and the transport vehicle 	L
	Struck-by sledge hammer	<ul style="list-style-type: none"> User shall verify immediate surrounding area is clear of obstructions and personnel Tap stake to start driving into ground Use two hands to control movement of sledge hammer Do not use another worker to stabilize the stake while hammering into the ground 	L

*(Note: Standard PPE required for this activity includes Hard Hat, Safety glasses with side protection, and safety-toe footwear. Additional PPE requirements are listed in this column depending on the hazard. This constitutes the Workplace Hazard Assessment per 29 CFR 1910.132. Additional assessments and PPE selection when needed will be documented on a JSA or daily briefing sign-in form and signed by the SSO in accordance with ECC SOP ESQ 6.1. Hazard assessment and respirator selection for inhalation hazards will be documented in the site Respiratory Protection Plan, if required.)

Activity Hazard Analysis (AHA)

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
<ul style="list-style-type: none">• Support truck• Rack truck• Forklift / Lull• Hand tools, Power tools	<ul style="list-style-type: none">• Competent Persons: None required.• Only qualified operators permitted to operate forklifts (carry certification).• Qualifications and competency reviewed by Supervisor. Licensed where required by state regulations.	<ul style="list-style-type: none">• Receipt by supervisor, SSHO. Notify GDA (client technical representative) before inspection.• Daily by operator or user

Activity Hazard Analysis (AHA)

[illegible]

Training Provided by: _____

Activity Hazard Analysis (AHA)

Activity/Work Task: Subsurface Drilling and Sampling	Overall Risk Assessment Code (RAC) (Use highest code)					L
Project Location: Former Harshaw Chemical Company	Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002	Severity	Probability				
Date Prepared /Revised: 5/2024		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert Brooks, CSP, STS-C, Program Health and Safety Manager	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP, Corporate Safety Director	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)				
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk
						M = Moderate Risk
						L = Low Risk
JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS				RAC
Mobilization	General Safety	To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & heavy equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit). Drinking water must be stored in a cooler clearly marked "Food & Drink Only – No Samples".				L
Direct Push Technology (DPT), Hollow Stem Auger (HSA), Air Rotary Activities	Contact with Overhead Utility Lines – Electrocutions, Fires/underground utilities.	<ul style="list-style-type: none"> Before work begins, survey the site for overhead power lines. LOOK UP! Equipment will not be used that is able to reach overhead power lines. If work must be conducted closer to utilities than guidelines allow, the utility company must be contacted. An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the ONLY job the observer is performing when an observer is required. Keep all personnel well away from the equipment whenever it is close to power lines. If intrusive activities, Ohio 811 shall be notified prior to with sufficient time allowed for white-lining and utility marking. <ul style="list-style-type: none"> — <u>Excavation Permit Procedure</u>: Mark the area for the requested clearance and then submit an excavation permit. Contact 811 is contacted 3 business days hours prior to activity start. 				L

Activity Hazard Analysis (AHA)

DPT, HSA, Air Rotary Activities (continued)		<ul style="list-style-type: none"> ECC personnel will "white-line" or otherwise mark the area where the wells are to be installed, prior to utility marking. Intrusive soil activities conducted within a five foot "Buffer Zone" (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro-excavation, or similar means (some jurisdictions require more stringent buffer zones). Spotter will assist the operator/workers to identify unknown conditions during drilling. If a previously unknown utility line is identified, uncovered, or disturbed during intrusive activities, stop immediately and project management notified. Intrusive operations shall not recommence until the line has been evaluated, identified, and the appropriate utility notified. Most utilities and marking services utilize the American Public Works Association Uniform Color Code for marking out utilities. All personnel involved in excavation projects will be familiar with this code. <p>Before derrick is raised a thorough walkthrough of surrounding area is required to ensure there are no overhead utilities within 100 feet horizontally. If overhead utilities are within 100 ft horizontally of the derrick, consult local utility company and refer to EM 385-1-1 Table 11-1 before commencing operations.</p>	
	Cuts/Lacerations	<ul style="list-style-type: none"> A cutting device designed for cutting acetate liners (procured through Geoprobe) shall be used. If a safety utility knife is used, snubbed nose blades are required and the user must wear Kevlar gloves under leather gloves. 	L
	Lifting Strains/Sprains	<ul style="list-style-type: none"> No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled and avoid pinch point hazards. While handling direct push rods and filled acetate liners, make sure proper lifting techniques are used. 	L
	Struck by or caught in drill rig equipment	<ul style="list-style-type: none"> Only qualified personnel shall be permitted to operate equipment. The equipment shall be inspected daily using an ECC inspection form specific for the equipment in use. Equipment must have functioning safety devices as installed by the manufacturer. Deficiencies in equipment shall be corrected prior to operating. Equipment found to be unsafe shall not be used. Fire extinguishers of the appropriate size will be available on the equipment. All equipment shall have back up enunciators. Only personnel essential to drill rig operation will be permitted in area directly surrounding drill rig. All personnel not directly contributing to drill rig operations will be required to stay a minimum of 25' away. Check all safety devices, emergency shut-down switches daily or at the start of drilling shift. Drilling will not be permitted until all emergency shut-down switches and warning systems are working properly. Drill rig operator is required to do a daily equipment checklist to ensure equipment is in safe working condition. <ul style="list-style-type: none"> Personnel need to be cognizant of surroundings and keep clear of cuttings discharge point. Eye protection will be worn at all times. 	L

Activity Hazard Analysis (AHA)

DPT, HSA, Air Rotary Activities (continued)		<ul style="list-style-type: none"> ○ Personnel need to remain away from air compressor and air hose unless a specific task requires work in close proximity. ○ Do not operate compressed air system with broken or inoperable safety controls. ○ Inspect airline safety cables to verify they are in good working condition. ● If augers are used during drilling operations, auger guards will be required. ● All work areas on and around the drill rig operation will be required to be kept clear of unnecessary equipment and materials. Ongoing housekeeping throughout the day will keep work areas free of slip, trip and fall hazards. 	
	Struck by Traffic	<ul style="list-style-type: none"> ● When working adjacent to or on active roadways adequate traffic control devices must be installed to establish a safe work zone. ● Adequate signage must be established to identify the work zone. ● All personnel entering and working in an established work zone must wear the classification of reflective vests (appropriate based on speed of vehicles). 	L
	Struck-By / Pinch Points	<ul style="list-style-type: none"> ● All personnel will wear ANSI Type 2 high-visibility traffic safety vests. Operators shall maintain a constant awareness of personnel and equipment in the work areas. ● Moving heavy equipment must have properly functioning back-up alarms. ● Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. ● Getting off or on any equipment while it is in motion is prohibited. ● Three points of contact shall be maintained when getting on or off equipment. ● Seats will be provided for each occupant of the equipment. ● The operator shall use safety belts while equipment is in use. ● All original manufacturer-installed safety equipment such as lights, guards, brakes, horn, etc. must be functional at all times. ● Whenever equipment is parked, the parking brake shall be set, and wheels chocked when on an incline ● Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment and/or vision ● Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge and approval. 	L
DPT, HSA, Air Rotary Activities	Struck-By / Pinch Points (Continued)	<ul style="list-style-type: none"> ● Personnel will stay out of equipment swing areas and pinch-points. When dumping a load from a bed equipped with a tailgate, a spotter must be positioned a safe distance from the vehicle, such that they can observe the bed to notify the operator if an obstruction occurs 	L
	Excessive Noise Exposure	<ul style="list-style-type: none"> ● Wear hearing protective devices (Ear muffs/plugs) when working, when using or near high noise producing equipment, or when directed by ECC SSHO or SSHO representative in response to noise monitoring. ● Ensure adequate maintenance on equipment. ● Conduct periodic sound level surveys. 	L
	Heat/Cold Stress (applies to all steps in this AHA)	<ul style="list-style-type: none"> ● Monitor weather conditions and implement controls in accordance with Heat/Cold Stress Prevention Plan in APP. ● Stay hydrated. ● Stop and rest in cool shaded area if heat strain symptoms occur and when instructed by SSHO. 	L

Activity Hazard Analysis (AHA)

(continued)		— Report all signs and symptoms of heat strain immediately to SSHO or site superintendent.	
	Severe weather (applies to all steps in this AHA)	<ul style="list-style-type: none"> • Shut down operations during severe storms, heavy rain, high wind, and lightning episodes. Evacuate the project site and take shelter at the designated shelter location. • All personnel shall be trained on the project Emergencies Response procedures. 	L
Welding/Cutting	Fire	<ul style="list-style-type: none"> • Personnel that weld or cut will be required to wear proper PPE including flame resistant gloves, aprons, safety shoes, welding helmets, goggles, and shaded glasses. • Fire extinguisher must be present. • Hot work permit must be obtained before any welding or cutting begins. • Verify that no combustible materials are within work area. • Fire watch must continue for 30 minutes after any welding or cutting concludes. • Protective caps must be used when moving cylinders. • Cylinders must be stored properly. 	L
Equipment Decontamination	Chemical Contamination Exposure	<ul style="list-style-type: none"> • All personnel assigned to drilling operations will operate inside a designated EZ. All PPE will be removed properly prior to exiting the CRZ. Air monitoring will be performed. All equipment and hand tools will be decontaminated in accordance with the established procedure. • Air monitoring will done for combustible gas exposure during drilling and well abandonment. 	L
Stop work and notify the Team Leader if you are not sure how to perform your task safely!		Stop work and notify the Team Leader if you are not sure how to perform your task safely!	Stop work and notify the Team Leader if you are not sure how to perform your task safely!
Equipment to be Used		Training Requirements	Inspection Requirements
<ol style="list-style-type: none"> 1. Support Vehicles 2. Drill Rig 3. Hand Tools 4. Air Monitoring Equipment (Multi-RAE Plus or equivalent) 5. <u>Support Zone</u> <ul style="list-style-type: none"> • Cell phone or radio communication • Eyewash station • Fire extinguishers • First aid kit • Drinking water • 911 air horn • Spill containment supplies • Air monitoring equipment, if needed • Emergency decontamination supplies • GFCI • Hand and power tools. <p>PPE: Level D (hardhat, steel toe boots, work gloves, Class 2 hi-viz safety garment, safety glasses, and hearing protection as needed), unless noted otherwise in this AHA</p>		<ul style="list-style-type: none"> • Only qualified operators permitted to operate mobile equipment • Operators of DPT and HSA rig will be a licensed driller. • Operators of forklifts will have recent certification / training in safe forklift operation (20 CFR 1910, Subpart N – Powered Industrial Trucks) • First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) • Initial Safety Orientation • Daily Safety Tailgate Meetings • Emergency Response Plan/Procedures • Fire extinguishers. 	<ul style="list-style-type: none"> • SSHO or SSHO representative will perform daily site inspection • Equipment – Receipt and inspected by SSHO or SSHO representative • Competent person will inspect equipment daily prior to each use. No equipment will be placed in service until all deficiencies are corrected • Complete daily equipment inspection form will be completed by the operator • Weekly inspection of first aid kits • Monthly inspection of fire extinguishers • GFCIs (at least monthly) • Air monitoring equipment will be calibrated at least monthly and bump tested daily before each shift and as often as necessary. Equipment that cannot pass bump test criteria will be recalibrated or replaced.

Activity Hazard Analysis (AHA)

Activity/Work Task: Decomissioning and Installation of Monitoring Wells		Overall Risk Assessment Code (RAC) (Use highest code)				L	
Project Location: Former Harshaw Chemical Company		Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002		Severity	Probability				
Date Prepared /Revised: 5/2024			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert Brooks, CSP, STS-C, Program Health and Safety Manager		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP, Corporate Safety Director		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
		"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					RAC Chart
		"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					
JOB STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS					RAC
Mobilization	General Safety	To minimize potential hazards all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures and equipment, operational aspects & heavy equipment use, and change(s) in site/work conditions. Daily housekeeping will be implemented at the end of each workday. Equipment vehicles must be set up with a fire extinguisher (min 10:BC & a FA Kit). Drinking water must be stored in a cooler clearly marked "Food & Drink Only – No Samples".					L
Decomissioning and Installation of Monitoring Wells	Accidents/cidents due to heavy equipment Moving equipment related accidents Worker / Property struck be moving equipment	<ul style="list-style-type: none"> Only authorized and qualified equipment operators may operate equipment. Equipment shall have a working Audible Back-up Alarm Ground workers, other than designated spotters, are to stay away from equipment especially inside area being excavated. Utilize proper PPE (safety vest, hard hat, steel toe shoes) Seat belts must always be worn while operating heavy equipment and trucks. Equipment operator shall understand and accept signals from designated signalman except during emergencies. Equipment must be inspected DAILY using the designated inspection form. Operators and drivers should always check intended path before backing-up. Avoid distraction & stop if necessary/distracted. Use of mobile phones & radios are PROHIBITED during operation of heavy equipment, dump trucks, graders, rollers, and any other type equipment. 					
Cont.							

Activity Hazard Analysis (AHA)

Decomissioning and installation of Monitoring Wells		Stop backing up at any time when you lose sight of spotter from mirror	
	Contact with Overhead Utility Lines – Electrocutions, Fires/underground utilities.	<ul style="list-style-type: none"> • Before work begins, survey the site for overhead power lines. LOOK UP! Equipment will not be used that is able to reach overhead power lines. • If work must be conducted closer to utilities than guidelines allow, the utility company must be contacted. • An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the ONLY job the observer is performing when an observer is required. • Keep all personnel well away from the equipment whenever it is close to power lines. • If intrusive activities, Ohio 811 shall be notified prior to with sufficient time allowed for white-lining and utility marking. <ul style="list-style-type: none"> — <u>Excavation Permit Procedure</u>: Mark the area for the requested clearance and then submit an excavation permit. Contact 811 is contacted 3 business days hours prior to activity start. • ECC personnel will “white-line” or otherwise mark the area where the wells are to be installed, prior to utility marking. • Intrusive soil activities conducted within a five foot “Buffer Zone” (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro-excavation, or similar means (some jurisdictions require more stringent buffer zones). Spotter will assist the operator/workers to identify unknown conditions during drilling. • If a previously unknown utility line is identified, uncovered, or disturbed during intrusive activities, stop immediately and project management notified. Intrusive operations shall not recommence until the line has been evaluated, identified, and the appropriate utility notified. Most utilities and marking services utilize the American Public Works Association Uniform Color Code for marking out utilities. All personnel involved in excavation projects will be familiar with this code. <p>Before derrick is raised a thorough walkthrough of surrounding area is required to ensure there are no overhead utilities within 100 feet horizontally. If overhead utilities are within 100 ft horizontally of the derrick, consult local utility company and refer to EM 385-1-1 Table 11-1 before commencing operations.</p>	L

Activity Hazard Analysis (AHA)

	Cuts/Lacerations	<ul style="list-style-type: none"> A cutting device designed for cutting acetate liners (procured through Geoprobe) shall be used. If a safety utility knife is used, snubbed nose blades are required and the user must wear Kevlar gloves under leather gloves. 	L
	Lifting Strains/Sprains	<ul style="list-style-type: none"> No individual employee is permitted to lift any object that weighs over 50 pounds. Proper lifting techniques shall be used. Multiple employees or the use of mechanical lifting are for lifting objects over the 50-pound limit. Materials shall be inspected for sharp edges prior to being handled and avoid pinch point hazards. While handling direct push rods and filled acetate liners, make sure proper lifting techniques are used. 	L
	Struck by or caught in drill rig equipment	<ul style="list-style-type: none"> Only qualified personnel shall be permitted to operate equipment. The equipment shall be inspected daily using an ECC inspection form specific for the equipment in use. Equipment must have functioning safety devices as installed by the manufacturer. Deficiencies in equipment shall be corrected prior to operating. Equipment found to be unsafe shall not be used. Fire extinguishers of the appropriate size will be available on the equipment. All equipment shall have back up enunciators. Only personnel essential to drill rig operation will be permitted in area directly surrounding drill rig. All personnel not directly contributing to drill rig operations will be required to stay a minimum of 25' away. Check all safety devices, emergency shut-down switches daily or at the start of drilling shift. Drilling will not be permitted until all emergency shut-down switches and warning systems are working properly. Drill rig operator is required to do a daily equipment checklist to ensure equipment is in safe working condition. <ul style="list-style-type: none"> Personnel need to be cognizant of surroundings and keep clear of cuttings discharge point. Eye protection will be worn at all times. Personnel need to remain away from air compressor and air hose unless a specific task requires work in close proximity. Do not operate compressed air system with broken or inoperable safety controls. Inspect airline safety cables to verify they are in good working condition. If augers are used during drilling operations, auger guards will be required. All work areas on and around the drill rig operation will be required to be kept clear of unnecessary equipment and materials. Ongoing housekeeping throughout the day will keep work areas free of slip, trip and fall hazards. 	L
	Struck by Traffic	<ul style="list-style-type: none"> When working adjacent to or on active roadways adequate traffic control devices must be installed to establish a safe work zone. Adequate signage must be established to identify the work zone. All personnel entering and working in an established work zone must wear the classification of reflective vests (appropriate based on speed of vehicles). 	L

Activity Hazard Analysis (AHA)

	Struck-By / Pinch Points	<ul style="list-style-type: none"> • All personnel will wear ANSI Type 2 high-visibility traffic safety vests. Operators shall maintain a constant awareness of personnel and equipment in the work areas. • Moving heavy equipment must have properly functioning back-up alarms. • Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. • Getting off or on any equipment while it is in motion is prohibited. • Three points of contact shall be maintained when getting on or off equipment. • Seats will be provided for each occupant of the equipment. • The operator shall use safety belts while equipment is in use. • All original manufacturer-installed safety equipment such as lights, guards, brakes, horn, etc. must be functional at all times. • Whenever equipment is parked, the parking brake shall be set, and wheels chocked when on an incline • Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment and/or vision • Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge and approval. 	L
	Struck-By / Pinch Points (Continued)	<ul style="list-style-type: none"> • Personnel will stay out of equipment swing areas and pinch-points. When dumping a load from a bed equipped with a tailgate, a spotter must be positioned a safe distance from the vehicle, such that they can observe the bed to notify the operator if an obstruction occurs 	L
	Excessive Noise Exposure	<ul style="list-style-type: none"> • Wear hearing protective devices (Ear muffs/plugs) when working, when using or near high noise producing equipment, or when directed by ECC SSHO or SSHO representative in response to noise monitoring. • Ensure adequate maintenance on equipment. • Conduct periodic sound level surveys. 	L
	Heat/Cold Stress (applies to all steps in this AHA)	<ul style="list-style-type: none"> • Monitor weather conditions and implement controls in accordance with Heat/Cold Stress Prevention Plan in APP. • Stay hydrated. • Stop and rest in cool shaded area if heat strain symptoms occur and when instructed by SSHO. <ul style="list-style-type: none"> — Report all signs and symptoms of heat strain immediately to SSHO or site superintendent. 	L
	Severe weather (applies to all steps in this AHA)	<ul style="list-style-type: none"> • Shut down operations during severe storms, heavy rain, high wind, and lightning episodes. Evacuate the project site and take shelter at the designated shelter location. • All personnel shall be trained on the project Emergencies Response procedures. 	L
Welding/Cutting	Fire	<ul style="list-style-type: none"> • Personnel that weld or cut will be required to wear proper PPE including flame resistant gloves, aprons, safety shoes, welding helmets, goggles, and shaded glasses. • Fire extinguisher must be present. • Hot work permit must be obtained before any welding or cutting begins. • Verify that no combustible materials are within work area. • Fire watch must continue for 30 minutes after any welding or cutting concludes. • Protective caps must be used when moving cylinders. • Cylinders must be stored properly. 	L

Activity Hazard Analysis (AHA)

Equipment Decontamination	Chemical Contamination Exposure	<ul style="list-style-type: none"> All personnel assigned to drilling operations will operate inside a designated EZ. All PPE will be removed properly prior to exiting the CRZ. Air monitoring will be performed. All equipment and hand tools will be decontaminated in accordance with the established procedure. Air monitoring will be done for combustible gas exposure during drilling and well abandonment. 	L
Stop work and notify the Team Leader if you are not sure how to perform your task safely!		Stop work and notify the Team Leader if you are not sure how to perform your task safely!	Stop work and notify the Team Leader if you are not sure how to perform your task safely!
Equipment to be Used	Training Requirements	Inspection Requirements	
<ol style="list-style-type: none"> Support Vehicles Drill Rig Hand Tools Air Monitoring Equipment (Multi-RAE Plus or equivalent) Support Zone <ul style="list-style-type: none"> Cell phone or radio communication Eyewash station Fire extinguishers First aid kit Drinking water 911 air horn Spill containment supplies Air monitoring equipment, if needed Emergency decontamination supplies GFCI Hand and power tools. <p>PPE: Level D (hardhat, steel toe boots, work gloves, Class 2 hi-viz safety garment, safety glasses, and hearing protection as needed), unless noted otherwise in this AHA</p>	<ul style="list-style-type: none"> Only qualified operators permitted to operate mobile equipment Operators of DPT and HSA rig will be a licensed driller. Operators of forklifts will have recent certification / training in safe forklift operation (20 CFR 1910, Subpart N – Powered Industrial Trucks) First Aid/Cardiopulmonary Resuscitation training (at least two individuals onsite) Initial Safety Orientation Daily Safety Tailgate Meetings Emergency Response Plan/Procedures Fire extinguishers. 	<ul style="list-style-type: none"> SSHO or SSHO representative will perform daily site inspection Equipment – Receipt and inspected by SSHO or SSHO representative Competent person will inspect equipment daily prior to each use. No equipment will be placed in service until all deficiencies are corrected Complete daily equipment inspection form will be completed by the operator Weekly inspection of first aid kits Monthly inspection of fire extinguishers GFCIs (at least monthly) Air monitoring equipment will be calibrated at least monthly and bump tested daily before each shift and as often as necessary. Equipment that cannot pass bump test criteria will be recalibrated or replaced. 	

Activity Hazard Analysis (AHA)

Activity/Work Task: Set Up and Operation of Wastewater Treatment System		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: Former Harshaw Chemical Company		Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002		Severity	Probability				
Date Prepared: May 2024			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert A. Brooks, CSP, STS-C/Program Health and Safety Manager		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Competent Person (Name/Title):		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) Probability is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					
Notes: (Field Notes, Review Comments, etc.)		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					
		L = Low Risk					
PRINCIPAL STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS				RAC	
Site Mobilization	<ul style="list-style-type: none"> Vehicle accidents 	<ul style="list-style-type: none"> Drive courteously and defensively; be aware of changing road conditions. Make sure all tools and materials are properly secured during transport. Obey all traffic laws. If tired or sleepy let someone else drive. Wear seatbelts at all times while in the vehicle. Do not talk or text on cell phone while driving. 				L	
	<ul style="list-style-type: none"> Rollovers, overhead utilities, crush hazards during offloading / loading heavy equipment. 	<ul style="list-style-type: none"> Only qualified operators shall load or unload equipment. Operator certifications shall be maintained in site files. Ensure overhead utilities are not present. All personnel shall remain outside the tip zone during offloading. Use spotters to load/ offload heavy equipment. 				L	
	<ul style="list-style-type: none"> Overhead utilities 	<ul style="list-style-type: none"> Perform survey of area and clearly identify overhead hazards. Ensure all mobilization activities take place in an area clear of overhead utility hazards. 				L	

Activity Hazard Analysis (AHA)

	<ul style="list-style-type: none"> Musculoskeletal Injuries, ergonomic strains 	<ul style="list-style-type: none"> Utilization of mechanical devices will be the first option on all appropriate lifting tasks. Site personnel will be instructed on proper lifting techniques. If manual lifting is required, have proper footing prior to lift. Always determine weight of material/ object prior to lifting. Do not lift more than 50 lbs (22kg) per individual, use two man lift. When lifting, lift with legs, keep back straight and chin up. 	L
	<ul style="list-style-type: none"> Crush, pinch points 	<ul style="list-style-type: none"> All material handling and heavy equipment operations shall take place in pre-determined areas away from pedestrian areas or other operations. Keep body and hands out of swing and turn radius of equipment. Do not get body and or hands/arms in between equipment and or materials. Make eye contact with vehicle operators before approaching/crossing within 25-feet. 	L
	<ul style="list-style-type: none"> Slips, trips falls 	<ul style="list-style-type: none"> Work areas will be visually inspected continuously for signs of poor housekeeping. Identified slip and trip hazards will be removed or guarded prior to beginning work. Appropriate illumination will be maintained on and around the entire work area. The minimum requirement for light required for exterior work is 5 foot-candles). Demarcate all above ground hazards (e.g., stakes, rebar, stub-ups, etc.). Use 3 points of contact when exiting trucks and equipment. 	L
Set Up of Treatment System	<ul style="list-style-type: none"> Falling materials, flying debris 	<ul style="list-style-type: none"> Loading equipment must have overhead cab protection. Haul equipment must have overhead cab protection (or drivers must leave the equipment and remain in a safe location during loading). 	L
	<ul style="list-style-type: none"> Caught between, pinch Points 	<ul style="list-style-type: none"> Ground personnel, vehicles, or other equipment SHALL NOT work within 1½ times inside the tip zone or swing radius of the equipment while in operation. Do not get between two pieces of heavy equipment unless they are secured in a zero mechanical state. Personnel will not attempt to dislodge stuck material by hand if mechanical methods are possible. Ensure all potential energy is removed or blocked before removing stuck material. Operators must minimize amount of materials spilled on the exterior of the trucks during loading operations (i.e. don't overfill the buckets). 	L
	<ul style="list-style-type: none"> Contact with wastewater treatment system structures 	<ul style="list-style-type: none"> Operators shall not overload buckets to the point visibility is obscured. Skid-steers and other equipment with rotating superstructures shall not operate within 1.5 times the swing radius of a structure, the load shall be also taken into consideration when determining the distance. 	L

Activity Hazard Analysis (AHA)

Set Up of Treatment System (Cont.)	Slips, trips, and falls	<ul style="list-style-type: none"> • Work areas will be continuously inspected for signs of poor housekeeping. • Identified slip and trip hazards will be removed or guarded prior to beginning work. • Appropriate illumination will be maintained around the entire work area. Portable lights will be used as necessary to maintain a minimum of 5 foot-candles in the work area. • Three points of contact must be maintained when climbing on and off of equipment. 	L
	Exposure to vehicular and heavy equipment traffic	<ul style="list-style-type: none"> • KEEP UNNECESSARY GROUND PERSONNEL AWAY from loading areas. • Wear reflective, ANSI Type 2 or 3 high visibility garments (e.g., vest, jacket) at all times in work areas. • Signs, barricades, flashers, flaggers, and other traffic control devices used in accordance with the Work Plan/Traffic Control Plan. 	L
	General heavy equipment hazards	<ul style="list-style-type: none"> • Only trained and qualified personnel will operate heavy equipment. Subcontractor is responsible for certifying all operators. • Equipment will be inspected before each shift and documented. • Ground personnel/operators will be familiar with appropriate hand signals in the work area. • Only one person will be allowed to direct the operator. • All heavy equipment will be equipped with manufacturer-supplied roll over protection and functional, audible back up alarms. • Personnel are not permitted inside of the swing radius of heavy equipment. • Buckets and other attachments are to be placed on the ground in a zero mechanical state before equipment is shut down. 	L
Operation of Wastewater Treatment System	Contact with hazardous materials.	<ul style="list-style-type: none"> • Wear appropriate PPE as indicated in APP/RPP when entering designated work zones. • Perform proper donning and doffing of PPE when accessing and exiting the designated Work Zone (WZ). • All disposable PPE shall be bagged and left inside the WZ at the end of the work day. 	

Activity Hazard Analysis (AHA)

Cont. Operation of Wastewater Treatment System	Spill and fire control	<ul style="list-style-type: none"> • Adequate spill absorbent will be present at all times. Personnel will be trained in the appropriate use. • All nozzles, hoses, caps, and all other associated wastewater treatment materials will be in good working order and properly secured during wastewater treatment operations • A minimum of one 20lb ABC fire extinguisher will be present at all fuel storage/fueling sites. Appropriate signage shall also be present. • Refueling nozzles will not be equipped with locking mechanisms. The person refueling must maintain hand contact with the nozzle at all times. 	L
	Adverse weather / Temperatures (low) Hypothermia	<ul style="list-style-type: none"> • Monitor local media for up-to-date severe weather forecasts. • Discontinue work during thunderstorms and severe weather events. • Dress accordingly to reduce potential for hypothermia; bring change of clothing if clothing gets wet. • Hydrate throughout the work day. 	L
	Insects, Snakes, Wildlife, Vegetation Exposures	<ul style="list-style-type: none"> • Inspect work areas when arriving for site assessment to identify hazard(s) • Use insect repellant as necessary • Workers with allergies should carry antidote kits, if necessary 	L
Equipment to be Used		Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Wastewater treatment system Fork Lift Hand Tools		<ul style="list-style-type: none"> • Competent Persons: TBD Treatment System Operator • Only qualified operators are permitted to operate forklifts (carry certification). • Qualifications and competency reviewed by Supervisor. Licensed where required by state regulations 	<ul style="list-style-type: none"> • Receipt by supervisor, SSHO. Notify GDA (client technical representative) before inspection. • Daily by operator or user

Activity Hazard Analysis (AHA)

[illegible]

Activity Hazard Analysis (AHA)

Activity/Work Task: Excavation & Backfill		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: Former Harshaw Chemical Company		Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002		Severity	Probability				
Date Prepared: May 2024			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert Brooks, CSP, STS-C/Program Health and Safety Manager		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Health and Safety Director		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each “Hazard” with identified safety “Controls” and determine RAC (See above)					
		“Probability” is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					RAC Chart
		“Severity” is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					E = Extremely High Risk
							H = High Risk
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each “Hazard” on AHA. Annotate the overall highest RAC at the top of AHA.					M = Moderate Risk
							L = Low Risk
Steps/Activity	Hazards	RECOMMENDED CONTROLS					RAC Code
Mobilize equipment, tools, and materials	Struck-by incidents, over exertion, property damage, vehicle collision	<ul style="list-style-type: none"> In congested areas use a spotter – if there is exposure to traffic use a trained flagger / site utilization map A Spotter w/ proper flagging will support and direct dump trucks during queuing of trucks for loading and backfill Survey area and barricade potential struck-against conditions or other sit conditions that pose a hazard to equipment / trucks & personnel Operator must be trained and deemed qualified for the specific equipment they will operate, operator shall conduct pre-operational inspection. 					L

Activity Hazard Analysis (AHA)

Heavy Equipment	Accidents due to heavy equipment Moving equipment related accidents Worker / Property struck by moving equipment	<ul style="list-style-type: none"> • Only authorized and qualified equipment operators may operate equipment • Equipment shall have a working Audible Back-up Alarm • Ground workers, other than designated spotters, are to stay away from equipment especially inside area being excavated • Utilize proper PPE (safety vest, hard hat, steel toe shoes) • Seat belts must always be worn while operating heavy equipment and trucks • Equipment operator shall understand and accept signals from designated signalman except during emergencies • Equipment must be inspected DAILY using the designated inspection form • Operators and drivers should always check intended path before backing-up • Avoid distraction & stop if necessary/distracted • Use of mobile phones & radios are PROHIBITED during operation of heavy equipment, dump trucks, graders, rollers, and any other type equipment. <p>Stop backing up at any time when you lose sight of spotter from mirror</p>	M
Excavation / Trenching	Accidents due to heavy equipment Moving equipment related accidents Worker / Property struck by moving equipment; cave-ins and exhaust build up	<ul style="list-style-type: none"> • Same as Above • Ensure excavation area is properly protected with fencing/barriers • Survey area for uneven surfaces – drop offs • Remain inside the designated (roped area) work zone • Survey for Utilities – Obtain DIG permit prior to performing field activities • Trenches/excavations shall be properly sloped/benched, or other protective means as determined by the competent person. • Protective systems shall be implemented in accordance with EM 385 1-1 Section 25. • Spoils shall be placed a minimum of 2 feet from the edge of the excavation • CP must inspect excavation daily, to ensure area around excavation and within excavation are stable • Near-by structures must be adequately supported • Equipment utilizing combustion engines must be placed at an adequate distance to prevent potential for carbon monoxide and other exhaust gas build up in excavation work areas. • Monitor with a four-gas meter if potential exists for exhaust to enter the excavation 	L
	Injuries by excavator (struck-by);	<ul style="list-style-type: none"> • Back-up alarm required for all heavy equipment (i.e., roller, excavator). • Utilize flagger if limited visibility or restricted movement is present • Establish eye contact with operator before approaching equipment • Always remain in clear view of the operator at all times • Only qualified designated operators on equipment 	L
Loading, Dumping, Placing of fill	Roll Over of dump trucks	<ul style="list-style-type: none"> • Only authorized, qualified and experienced equipment operators are to be used • Ensure that dump truck is on level ground while being loaded and unloaded 	L

Activity Hazard Analysis (AHA)

	<p>Loss of control of dump trucks - distraction</p> <p>Failing breaks</p> <p>Traffic related vehicular accidents</p> <p>Release of Fugitive Dust</p>	<ul style="list-style-type: none"> • Equipment must be inspected DAILY using the designated inspection form • Ensure that the trucks and other equipment are operated at safe speed (Max 15 Km within established work area / 20 Km on haul road) • DO NOT use cellphones, radio, walkie-talkies while driving or operating equipment • Ensure that periodic maintenance is performed on equipment & trucks • Post trained flaggers to control & direct traffic; wear high visibility reflective vests Regular watering of the area to minimize dust generation 	
Compaction – Backfill	<p>Accidents due to heavy equipment</p> <p>Moving equipment related</p> <p>Accidents</p> <p>Worker / Property struck by moving equipment</p>	<ul style="list-style-type: none"> • Only authorized and qualified equipment operators may operate equipment • Equipment shall have a working Audible Back-up Alarm • Ground workers, other than designated spotters, are to stay away from equipment especially inside area being excavated • Wearing of PPE (safety vest, hard hat, steel toe shoes) • Seat belts must always be worn while operating heavy equipment and trucks • Equipment operator shall understand and accept signals from designated signalman except during emergencies • Equipment must be inspected DAILY using the designated inspection form • Operators and drivers should always check intended path before backing-up • Avoid distraction & stop if necessary/distracted • Use of mobile phones & radios are PROHIBITED during operation of heavy equipment, dump trucks, graders, rollers, and any other type equipment. <p>Stop backing up at any time when you lose sight of spotter from mirror</p>	L
Stop work and notify your supervisor if you are not sure how to perform your task safely!			
Equipment	Training Requirements/Competent or Qualified Personnel Name(s)	Inspections	
<ul style="list-style-type: none"> • Fence, Signs and Marking Materials. • Barriers, Warning Signs, Lights, Flags, Traffic Cones, Barricade. • Dump Truck • Excavator • Generator • Ladders 	<ul style="list-style-type: none"> • Indoctrination Training. • Daily Tool Box Meetings. • Using Portable Fire Extinguishers • Using Ladders • Excavating Operations <p>Competent / Qualified Person(s):</p> <p>EFS – TBD</p> <p>Subk – TBD</p>	<ul style="list-style-type: none"> • Fire Extinguisher (Monthly). • Ladders (Daily). • All Heavy Equipment (Daily). • Motor Vehicles (Daily). • Excavation (Daily) 	

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK: Handling, Stockpiling, Transportation and Disposal of Contaminated Materials	Overall Risk Assessment Code (RAC) (Use highest code)				M	
PROJECT LOCATION: Former Harshaw Chemical Company						
CONTRACT NUMBER W912P424C0002:	Risk Assessment Code (RAC) Matrix					
DATE PREPARED: May 2024	Severity	Probability				
PREPARED BY: (Name/Title): Robert A Brooks, CSP, STS-C/Program Health and Safety Manager		Frequent	Likely	Occasional	Seldom	Unlikely
REVIEWED BY: (Name/Title): Bob Brooks, CSP, SSSH/Corporate Safety Director	Catastrophic	E	E	H	H	M
Notes: (Field Notes, Review Comments, etc.)	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	Probability: likelihood the activity will cause a Mishap (near miss, incident or accident). Identify as Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart	
Severity: the outcome if a mishap occurred. Identify as Catastrophic, Critical, Marginal, or Negligible.				E = Extremely High Risk		
Step 2: Identify the RAC (probability vs. severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk		
				M = Moderate Risk		
				L = Low Risk		

Job Steps	Hazard	Controls*	RAC
Handling and Stockpiling of Contaminated Materials <ul style="list-style-type: none"> Asphalt Concrete Rebar 	Electrocution/gas explosion/	<ul style="list-style-type: none"> Ensure utilities are identified and de-energized before operations begin. Make notification to USA 811 to have utilities marked out. Contractor is responsible to "pothole" to locate depth and direction of utilities. Mechanical excavation in proximity to known utilities will be limited to 2-ft either side of utility. Hand digging only w/ in 2-ft of utility. A spotter is needed if mechanical excavation between 2 – 4 ft of mark out. 	L
	Exposure to radioactive materials	<ul style="list-style-type: none"> Wear Level C protection per the RPP. Pre-wet the structure and surrounding ground. Maintain water spray on the structure and debris during the demolition and loading process. 	L
	Struck by falling and flying debris	<ul style="list-style-type: none"> Do not try to remove items from unsafe structures until an 	

Activity Hazard Analysis (AHA)

		evaluation is conducted by ECC and a field supervisor. If there is a structural issue, then an engineer shall be consulted.	L
--	--	---	---

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> • A preliminary evaluation of the parcel is to be performed by the foreman and operator to determine the stability of existing structures (i.e., fireplace, chimney, wall) as to whether it will become a hazard during debris clearance operations. Standing chimneys will be demolished by chimney tipping crew before starting debris removal. • If other structure has a potential to become unstable or poses a safety hazard for the crew the structure will be removed. • Establish a safe zone prior to felling any fireplace chimneys or other tall masonry structures. • Demolition will be done mechanically with excavators. • Ground personnel stay out of working radius of the machine and out of the drop area. • Excavator will have safety glass windshields. All windows and doors will be closed. Where a windshield has been damaged or completely broken the excavator will be removed from service. The repaired equipment shall be re-inspected prior to being placed into service. • To the extent possible, the material will be sized by the excavator, just enough to fit into the haul trucks. Concrete and rebar will NOT be permitted to stick out beyond the walls of the dump bed. • Stand clear of all demo debris loading operations. • A safe buffer using traffic control delineators (i.e., cones, candle sticks) will be established in the public ROW whenever side loading of trucks will be performed parallel to the curb. • A flagger MUST be positioned in the public ROW during side loading of trucks in the public ROW. • Fire damaged vehicles shall not be double stacked. Vehicles shall be temporarily staged on level and solid ground surface. 	

Activity Hazard Analysis (AHA)

	Struck-by or against	<ul style="list-style-type: none"> Prior to debris removal on properties containing vertical walls, retaining walls, or chimneys the Subcontractor Supr. shall conduct a site reconnaissance and perform an evaluation that MUST be documented using a Job Safety Analysis (JSA). All JSA shall be reviewed with ECC's field Supr. or SSHO to verify safest means & methods have been identified and all hazard controls have been identified. 	M
--	----------------------	--	---

Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> NO WORK shall be permitted until the JSA/AHA has been reviewed by ECC. The JSA/AHA MUST be reviewed with the field crew and all members must sign off on the JSA/AHA. A JSA/JHA shall be prepared daily on parcels where these conditions exist. 	
	Musculoskeletal Injuries, ergonomic strains	<ul style="list-style-type: none"> Utilization of mechanical devices will be the first option on all appropriate lifting tasks. Site personnel will be instructed on and implement proper lifting techniques when handling metals and other debris. If manual lifting is required, have proper footing prior to lift. Always determine weight of material/ object prior to lifting. Do not lift more than 50 lbs. (22kg) per individual, use two-man lift. When lifting, lift with legs, keep back straight and chin up. 	L

Activity Hazard Analysis (AHA)

	<p>Fires/explosions using chop saws / cutting torches</p> <p>Exposure to fumes</p> <p>Burns</p>	<ul style="list-style-type: none"> • If it is necessary to size metal rebar or other structural steel using chop saws or cutting torches, complete a daily Hot Work Permit. The HW Permit will be authorized by the field supervisor / foreman. The permit will be cancelled at the end of the workday. • Remove all HHW, any flammable/combustible liquids before starting. Ensure any gas service is shut off and isolated. • Place gas cylinders in a secure and stable location. Inspect the hoses and torches before use. <ul style="list-style-type: none"> • Use long demo torches to avoid direct exposure to fumes. Try to position upwind of the items being cut. • Wear leather welders' gloves, shaded cutting goggles or face shields with safety glasses when torch cutting. Avoid handling hot items. • For frequent use of chop saws to cut rebar or metal waste chaps shall be worn to protect Tyvek from melting. 	L
	<p>Slips, trips, falls</p> <p>Lacerations</p> <p>Impalement</p> <p>Falling on debris – punctures and lacerations</p>	<ul style="list-style-type: none"> • Do not unnecessarily walk through demo debris. • If walking among debris for manual sizing, sorting and segregating pick the safest route and ensure good firm work positioning. Do not stand on unstable debris. • When handling metals or working within WZ's containing scrap metal laborers shall wear additional hand protection (i.e., leather palm work gloves or similar) to protect against abrasions / lacerations. 	L

Job Steps	Hazards	Controls*	RAC
-----------	---------	-----------	-----

Activity Hazard Analysis (AHA)

		<ul style="list-style-type: none"> Rebar protruding from stem walls or pile caps shall be either bent downward, cut flush or protected with OSHA approved caps. As a temporary measure, establish caution tape to identify the hazard area and inform personnel not to enter. When working by retaining walls or elevated foundations (> 6- ft fall protection shall be implemented. Use of warning lines to establish safety buffers or employing fall protection systems will be acceptable options to address this. If a fall protection system is selected a Fall Protection Plan must be developed and submitted for review. Work above rebar or other objects that pose a potential impalement hazard MUST be protected using an OSHA approved rebar cap or other means consistent with OSHA requirements. Appropriate illumination will be maintained on and around the entire work area. The minimum requirement for light required for exterior work is 5 foot-candles). Use three points of contact when exiting trucks and equipment. 	
Removal, loading transportation and disposal of Asphalt/Concrete debris.	Struck by falling and flying debris (projectile)	<ul style="list-style-type: none"> Demolition will be done mechanically with excavators. Ground personnel stay out of working radius of the machine and out of the drop area. Excavator will have safety glass windshields. All windows and doors will be closed. When using a Hoe-Ram attachment on an excavator – Ground personnel shall maintain a safe distance to avoid being struck by projectiles. If laborer is assigned to dust suppression, then a face shield (in addition to safety glasses) shall be worn. To the extent possible, the material will be sized by the excavator, just enough to fit into the haul trucks. A safe buffer using traffic control delineators (i.e., cones, candle sticks) will be established in the public ROW whenever side loading of trucks will be performed parallel to the curb. A flagger MUST be positioned in the public ROW during side loading of trucks in the public ROW. 	L
	Struck-by equipment	<ul style="list-style-type: none"> Ground personnel, vehicles, or other equipment SHALL NOT 	L

Activity Hazard Analysis (AHA)

		work within 1½ times inside the tip zone or swing radius of the equipment while in operation.	
Job Steps	Hazards	Controls*	RAC
		<ul style="list-style-type: none"> Operator will wear seat belt during operations. Make eye contact with operator before approaching equipment. Equipment will be operated by trained/experience personnel only. 	
	Exposure to Silica/Resp. Dust	<ul style="list-style-type: none"> Utilize engineering controls (i.e., water spray) constantly to reduce the potential for dust generation. Ensure cab doors and windows remain closed to minimize exposure. Pre-wet the structure and surrounding ground. Maintain a water spray on the structure during the demolition process. 	L
	Noise	<ul style="list-style-type: none"> Periodically monitor noise levels in work area with sound level meter. Wear hearing protection when working around noise generating equipment or where noise levels exceed 85 dBA. 	L
	Potential energy from cutting rebar with concrete still attached at both ends.	<ul style="list-style-type: none"> Rebar will not be cut (rebar cutter, grinder, etc.) if concrete is still attached at both ends. Heavy equipment or a jackhammer will be utilized to remove the concrete from one end of the imbedded rebar. Cuts will be made only on rebar with one exposed end. Face shields will be worn during any cutting operations. 	
Lining debris trucks	Falls	<ul style="list-style-type: none"> Line truck beds to the extent possible from outside the bed. Stand on ground, or on secure scaffolding with guardrails. If the bed must be entered, use a step ladder or a secured straight ladder for access. 	L
Loading and transportation of debris in trucks	Exposure to contaminated debris	<ul style="list-style-type: none"> Wear Level C protection per the RPP. Pre-wet the area. Wet the material as it is being loaded if visible dust is present or the site Perimeter Action Levels are exceeded. – See Air Monitoring/Radiation Protection Plan. 	L

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
	<ul style="list-style-type: none"> Falling materials, flying debris 	<ul style="list-style-type: none"> Loading equipment must have overhead cab protection. Haul equipment must have overhead cab protection (or drivers must leave the equipment and remain in a safe location during loading). Don't stand next to a truck being loaded. 	L
	<ul style="list-style-type: none"> Caught between, pinch points 	<ul style="list-style-type: none"> Ground personnel, vehicles, or other equipment SHALL NOT work within 1½ times inside the tip zone or swing radius of the equipment while in operation. Do not get between two pieces of heavy equipment unless they are secured in a zero mechanical state. Personnel will not attempt to dislodge stuck material by hand if mechanical methods are possible. Ensure all potential energy is removed or blocked before removing stuck material. Operators must minimize amount of materials spilled on the exterior of the trucks during loading operations (i.e. don't overfill the buckets). 	L
	<ul style="list-style-type: none"> Exposure to vehicular and heavy equipment traffic 	<ul style="list-style-type: none"> KEEP UNNECESSARY GROUND PERSONNEL AWAY from loading areas. Wear reflective, ANSI Type 2 or 3 high visibility garments (e.g., vest, jacket) at all times in work areas, except when in the exclusion zone where white Tyvek is worn. If loading operations encroach on public right of way, implement the Traffic Control Plan. 	L

Activity Hazard Analysis (AHA)

	<ul style="list-style-type: none"> General heavy equipment hazards 	<ul style="list-style-type: none"> Only trained and qualified personnel will operate heavy equipment. Subcontractor is responsible for certifying all operators. Equipment will be inspected before each shift and documented. Ground personnel/operators will be familiar with appropriate hand signals in the work area. Only one person will be allowed to direct the operator. All heavy equipment will be equipped with manufacturer-supplied roll over protection and functional, audible back up alarms. Personnel are not permitted inside of the swing radius of heavy equipment. Buckets and other attachments are to be placed on the 	L
Job Steps	Hazards	Controls*	RAC
		ground in a zero mechanical state before equipment is shut down.	
Covering load	<ul style="list-style-type: none"> Falls Exposure to dust 	<ul style="list-style-type: none"> Loads should be covered by pulling the liner over on both sides with hand tools from the ground. Do not enter truck bed to cover loads. Secure the overlapped liner with heavy material to prevent blowing open and releasing dust in transport. 	L

Activity Hazard Analysis (AHA)

Hauling and dumping	<ul style="list-style-type: none"> Vehicle accidents 	<ul style="list-style-type: none"> When required by DOT regulations, drivers shall have current CDL. All trucks shall be in proper working order and shall be inspected prior to being put in service each day. The daily inspection shall be documented. All dump trucks and trucks used for towing trailers shall have functional, audible backup alarms. Trucks will not be loaded beyond their specified gross vehicle rating. Spotters will be used at all times when backing trucks or operating in tight conditions, when blind spots exist, or when working around low hanging power lines. All vehicles shall stop at uncontrolled intersections in residential areas. Sides shall not be extended more than 3 feet above manufactured sides. 	M
	<ul style="list-style-type: none"> Excess debris escaping from the trailer. 	<ul style="list-style-type: none"> Trucks will meet OSHA specifications for sides and latching tailgates. All debris shall be properly sized so as not to hang over edges of truck bed. Use pole saws to trim debris if necessary. All trucks or trailers hauling debris shall be tarped or covered during transportation to prevent and contain material from falling out. 	L
	<ul style="list-style-type: none"> Tip-overs 	<ul style="list-style-type: none"> Trucks will be positioned on firm level ground prior to raising the bed for dumping. Spotters will be used if necessary to back trucks. Spotters will remain in the front of the truck when the bed is raised to avoid being struck by tipping trucks. Maintain an adequate amount of space between trucks at the tipping location (this should be at a minimum, the bed length 	M

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls*	RAC
		<p>of the truck plus ten feet) so that in the event a truck tips on its side, it does not hit an adjacent truck, or piece of equipment.</p> <ul style="list-style-type: none"> Trucks beds shall be lowered immediately at completion of dumping and prior to leaving. Drivers are to ensure they are dumping on stable even ground to avoid tipping over. Drivers are responsible for safely dumping the load and should reposition if they are concerned with the immediate dumping area. 	
	<ul style="list-style-type: none"> Vehicle Fire 	<ul style="list-style-type: none"> Fire extinguishers shall be required in all vehicles, trucks, and equipment. Fuel and oil spills shall be immediately cleaned up with appropriate adsorbent materials. 	L
Fueling of Heavy Equipment	<ul style="list-style-type: none"> Spill and fire control 	<ul style="list-style-type: none"> Adequate spill absorbent will be present at all times. Personnel will be trained in the appropriate use. All nozzles, hoses, caps, and all other associated fueling material will be in good working order and properly secured after fueling is complete. Ensure that proper grounding/bonding is utilized when transfer of fuels is taking place. A minimum of one 20lb ABC fire extinguisher will be present at all fuel storage/fueling sites. Appropriate signage shall also be present. All heavy equipment shall be equipped with at least one 10B:C fire extinguisher. Refueling nozzles will not be equipped with locking mechanisms. The person refueling must maintain hand contact with the nozzle at all times. 	L

Activity Hazard Analysis (AHA)

[illegible]

Activity Hazard Analysis (AHA)

[illegible]

Activity Hazard Analysis (AHA)

Activity/Work Task: Removal of Paving and Concrete Pad		Overall Risk Assessment Code (RAC) (Use highest code) M					
Project Title/Location: Former Harshaw Chemical Company		Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002		Severity	Probability				
Date Prepared: May 2024			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert A Brooks, CSP, STS-C/Program Health and Safety Manager		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (see above)					
Notes: (Field Notes, Review, Comments, etc.)		<p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely</p> <p>"Severity" is the outcome/degree if an incident, near miss or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA</p>		RAC CHART			
				E = Extremely High Risk			
				H = High Risk			
				M = Moderate Risk			
				L = Low Risk			
Job Steps	Hazards	Controls			RAC		
General Safety Requirements	<ul style="list-style-type: none"> General Site Hazards/ Exposure to Heat Stress / Dehydration 	<p>Minimum Personal Protective Equipment Dress:</p> <ul style="list-style-type: none"> Long Pants Shirts with Sleeves Hardhat – ANSI Z89 Safety Shoes – ANSI Z41 Safety Glasses – ANSI Z87 Safety Vest – ANSI/ISEA 107-2010 Class 2 Appropriate Work Gloves <p>Weather:</p> <ul style="list-style-type: none"> Weather appropriate clothing for hot weather. Seek shelter in case of lightning – vehicles or properly grounded structures. <p>Dehydration:</p> <ul style="list-style-type: none"> Drink at least ½ liter of water an hour Proper hydration practices and work/rest breaks by the workers and enforced by the supervisors. Employer will provide good, clean drinking water daily with cups. 			L		

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls	RAC
Cont. General Safety Requirements	Arrival of New Personnel to Site Unfamiliar with Site Hazards, APP, Emergency Response, etc.	<ul style="list-style-type: none"> All Personnel shall attend the site-specific safety orientation. After personnel are trained in the contents of the APP and AHA's. All personnel shall attend Weekly Site-Specific Safety Training 	L
	Failure of PPE / Safety Equipment	<ul style="list-style-type: none"> All employees and supervisors shall inspect all safety equipment before use for excessive wear and/or damage. Tag out and remove all defective safety equipment from Jobsite. Consult manufacturer instructions for appropriate inspection requirements. 	L
	Housekeeping	<ul style="list-style-type: none"> Maintain good housekeeping at all times – remove debris and unused materials. Clean daily. Keep all walkways clear of cords, materials, and debris for clear access always. 	L
Mobilization of Equipment	Personal Injury	<ul style="list-style-type: none"> Have a spotter available during unloading of equipment. Use a designated haul route. Use appropriate equipment to transport. Operators must certified to operate equipment. All operators must do a pre-inspection checklist before using vehicle. 	L
Unloading	Tripping / Falling Falling Objects	<ul style="list-style-type: none"> Securely fasten all material stored or stacked against falling or sliding. Proper cribbing under material Store in proper area Material will not be lifted above or over personnel. 	L
Material Handling	Sprains / Strains. Back Injury Tripping / Falling Eye Injury	<ul style="list-style-type: none"> Use adequate manpower and/or equipment to deliver material. Use proper lifting procedures. Orderly housekeeping shall be maintained. Materials, tools and chemicals labeled and stored properly. Dust and eye protection shall be utilized during moving and cutting of materials 	L

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls	RAC
Asphalt/Concrete Removal	Falling objects, pinches, cuts, falling from lift, lift/equipment failure, causing of injury to nearby foot or vehicle traffic	<ul style="list-style-type: none"> • All employees shall wear 100% PPE including glasses (Z87), hardhat, boots, gloves. • Fall restraint shall be worn when working near the edge. • Fall restraint shall be attached to an approved anchor point. (Can the anchor point hold a pickup truck?) • Flag/Barricade off falling object area with hazard tape. • Operate hand tools and boom lift per manufacturers recommendation. • 100% tied off while working in the boom lift. • Ensure spotter is nearby when moving equipment. • Perform daily inspection on equipment prior to use. 	L
	Eye Injury / Debris enter eyes	<ul style="list-style-type: none"> • Use approved safety glasses/eye protection at all times 	L
	Hand Tools and Power Tools usage	<ul style="list-style-type: none"> • Always inspect tools prior to use. • Ensure equipment is clean and tools are in working condition 	L
	Heat Stroke, Heat Exhaustion, Heat Cramps, Sunburns, Overexertion	<ul style="list-style-type: none"> • Always have adequate supply of cold water • Take scheduled cool down breaks • In case of heat hazards occur call 911 • Only persons trained in first aid should be allowed to administer first aid 	L
	<ul style="list-style-type: none"> • Struck by Equipment, backing and during operation 	<ul style="list-style-type: none"> • All workers shall maintain a safe distance from the equipment, in addition workers are not allowed to direct the operator unless designated as a Spotter • Both operator and assigned spotter must have an eye contact with each other during operation 	M

Activity Hazard Analysis (AHA)

Job Steps	Hazards	Controls	RAC
Cont. Asphalt/Concrete Removal	Leaking, worn or damaged components that could cause faulty operation resulting in Impact or Compression to operator or bystander	<ul style="list-style-type: none"> If deficiencies are noted do not operate the unit. All problems must be corrected prior to operation. Fire Extinguishers must be always on the vehicle beside operators hatch. Oil drip pans must be always on site to catch leak if leaking occurs. 	L
	Back injury	<ul style="list-style-type: none"> If load is more than 40 pounds. Workers must assist each other in carrying the load to prevent back injury. Never carry by yourself always ask for help 	L
	Skin / Eye Irritation	<ul style="list-style-type: none"> Wear long sleeves clothing and rubberized gloves to avoid skin irritation Always wear goggles when doing this activity. 	L
	Foot and head injury	<ul style="list-style-type: none"> Wear proper working gloves when the possibility of lacerations or other injury may be caused by sharp edges or other objects. Ensure all manufacturers' guards are in place while operating the power tools. 	L
	Impalement	<ul style="list-style-type: none"> Rebars must be capped or guarded 	M
	Slip, trips and falls	<ul style="list-style-type: none"> Personnel should inspect areas where debris or slick surfaces are present to prevent tripping and slipping. accidents. Appropriate footwear is needed to provide adequate traction. Safety shoes are required for all personal to provide both adequate footwear with traction and to protect the feet. 	L
	Electrocution or Shock	<ul style="list-style-type: none"> When using electric power tools, inspect the tools daily. Ensure all proper tools are properly grounded or double insulated and that no power cord are frayed or damaged. Use GFCI outlets. Ensure all extension cords are out of personnel path of travel to eliminate trip hazards and damaged to the cords. When hanging the cord across the path, maintain the extension cord 1ft high above tallest guy on the site. 	M
Disposal of Asphalt/Concrete	Contamination of asphalt/concrete on the ground	<ul style="list-style-type: none"> Asphalt/Concrete waste must be dispose into a box with polyurethane to protect from spillage on the ground. 	L

Activity Hazard Analysis (AHA)

	Back injury	<ul style="list-style-type: none"> If load is more than 40 pounds. Workers must assist each other in carrying the load to prevent back injury. Never carry by yourself always ask for help 	L
	Slipping and Tripping potential	<ul style="list-style-type: none"> Personnel should inspect areas where debris or slick surfaces are present to prevent tripping and slipping. accidents. Appropriate footwear is needed to provide adequate traction. Safety shoes are required for all personal to provide both adequate footwear with traction and to protect the feet. 	L
Site Clean Up/Demobilization/House Keeping,	High Temperature	<ul style="list-style-type: none"> Monitor workers for sign of heat stress. Supply cool drinking water for breaks. 	L
	Flying Particles and Dust	<ul style="list-style-type: none"> Always wear eye goggles and dust mask. Wearing of dust mask are voluntary only on Assigned activities. Emergency Eye Wash Station on Site 	L
	Respiratory Illness from unloaded materials	Personnel must wear mask to protect from inhaling dust. Follow PPE as directed by Health Physicist and Radiation Protection (Plan	M
	Electrical Shock or Electrocutation	<ul style="list-style-type: none"> When using any electrical tools ensure they are only plugged into GFCI outlets only. Make sure that any extension cords being used is free from defect like nicks 	L
	<ul style="list-style-type: none"> Sharp Object 	<ul style="list-style-type: none"> Wear proper working globes when the possibility of lacerations or other injury may be caused by sharp edges or other objects. Provide emergency medicine cabinets/supplies at the worksite. 	L

Activity Hazard Analysis (AHA)

Equipment to be used	Training Requirements & Competent or Qualified Personnel Name(s)	Inspection Requirements
PPE (Hard Hat, Safety Glasses, Vest, Shoes, Gloves, Hearing Projection)	All workers will be trained in the proper donning and use of PPE before beginning work.	Inspect ALL PPE prior to each use. Any damaged PPE will be replaced immediately.
First Aid Kit, Eyewash, Fire Extinguisher	Covered in Jobsite Orientation, AHA, and Weekly/Daily Meetings.	Inspect Monthly
Small Hand tools of trade/Power Tools/Bush Cutter, Jackhammer, Concrete Cutter.	All workers will be briefed by the AHA of the ongoing activities and conduct Safety Indoctrination including tools and equipment used on the Jobsite before the start of each work.	Inspected daily for broken parts, loose handles or components, etc. Any equipment found defective will be tagged, taken out of service, and replaced immediately.
Excavator Front End Loader BobCat	Competent Person(s): TBD	

Activity Hazard Analysis (AHA)

[illegible]

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK: Asphalt Paving	Overall Risk Assessment Code (RAC) (Use highest code)					L
PROJECT LOCATION: Former Harshaw Chemical Company						
CONTRACT NUMBER: W912P424C0002	Risk Assessment Code (RAC) Matrix					
DATE PREPARED: May 2024	Severity	Probability				
PREPARED BY: (Name/Title): Robert A. Brooks, CSP, STS-C		Frequent	Likely	Occasional	Seldom	Unlikely
REVIEWED BY: (Name/Title): Kym Edelman, CIH, CSP	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	Probability: likelihood the activity will cause a Mishap (near miss, incident or accident). Identify as Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart	
	Severity: the outcome if a mishap occurred. Identify as Catastrophic, Critical, Marginal, or Negligible.				E = Extremely High Risk	
					H = High Risk	
	Step 2: Identify the RAC (probability vs. severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				M = Moderate Risk	
						L = Low Risk

Job Steps	Hazards	Controls	RAC
General site work <ul style="list-style-type: none"> - Fueling equipment - Setting up jobsite - Work area inspection 	Hazards associated with normal work activities: <ul style="list-style-type: none"> • Inclement weather • Biological hazards • Low light conditions • Manual lifting • Emergency preparedness • Fire prevention 	<ul style="list-style-type: none"> • To minimize potential hazards, all personnel shall attend site orientation prior to start of work activities in addition to daily Safety Tailgate meetings to familiarize themselves to hazards, emergency procedures, operational aspects, heavy equipment use, and change(s) in site work conditions. Daily housekeeping will be implemented during and at the end of each workday. No work will occur until all site personnel have reviewed and signed this document. • All personnel will wear minimum of Level D PPE: long pants, short sleeved shirt, safety toed footwear, safety glasses, hart hats, and high visibility class 2 vests. Work gloves will be worn for material handling. Hearing protection may be required for saw cutting or prolonged exposure to heavy machinery noise • Create and clearly delineated exclusion zone for equipment to operate within that limits access to the demolition work area and provides a safe buffer zone for ground support 	L

		<p>personnel to occupy. Post signage warning signage on jobsite perimeter as needed.</p> <ul style="list-style-type: none"> • Check for above ground and subsurface utilities prior to use. Keep all heavy equipment at least 10ft away from overhead utilities. • Monitor weather conditions and plan for inclement weather or temperature extremes by dressing appropriately or adjusting or pausing work tasks. Ensure that all workers have access to potable drinking water. • No one person will lift more than 50 pounds without getting help. Utilize proper lifting technique: lift with your legs, keep your back straight and the load close to the body. The use of mechanical equipment to handle materials will be the preferred method when plausible. • All work will be conducted during daylight hours and meet the minimum lighting requirements for outdoor work (55 LUX or 5 foot-candles). • Monitor the jobsite and avoid potential biological hazards such as stinging or biting insects, venomous reptiles or other potentially hazardous animals or plants. • All personnel will be made aware of evacuation routes, muster points, and the location of the nearest hospital should, and emergency occur. • All heavy equipment will be equipped with a fire extinguisher and inspected on a monthly basis. • Only fuel equipment that is sufficiently cool and powered off. Only utilize metal safety cans for dispensing fuel 	L
<p>Demo and material load out of existing asphalt</p> <ul style="list-style-type: none"> - Asphalt saw (handheld gas powered) - Hand tools - Backhoe / loader / skid steer - Dump truck - Dust and track out control equipment (sweeper / water buffalo) – If necessary 	<ul style="list-style-type: none"> • Slips, trips, falls • Equipment defects • Pinch points • Struck by • Caught in between • Pedestrian safety • Flying debris • Ergonomic hazards • Manual lifting • Dust inhalation • Utility contact 	<ul style="list-style-type: none"> • Thoroughly inspect the jobsite and walk the path of travel of for the equipment. Remove or mark potential trip hazards for ground personnel. • Provisions will be made for public protection. Spotters will be utilized for equipment movement and delineation will be installed to discourage unauthorized jobsite access from the public. • Equipment spotters will stay in line of sight of operators and utilize hand signals. • Recognize pinch point and struck by hazards created by the movement of heavy equipment. • Utilize 3 points of contact when entering and exiting equipment. • Never place your body in between equipment and unmovable objects. 	M

		<ul style="list-style-type: none"> • Limit job site access to essential personnel and stage personal vehicles out of work zone and equipment path of travel. • When using an asphalt cutting saw, ensure that a face shield is worn with safety glasses to protect against flying debris. Inspect the blade and saw for defects prior to use. If dust is generated, apply water to reduce the creation of visible dust. • Thoroughly inspect all heavy equipment and tools for defects or damage prior to use. • Water for dust suppression will be obtained from a local fire hydrant and a fire hose will be used to spray water to control dust. Ensure that all dust controls are in place prior to control fugitive dust as needed. • Ground personnel will serve as spotters for truck drivers and alert them to pedestrian traffic and ensure that waste bins are staged in appropriate locations. • No one person will lift more than 50 pounds without getting help. Utilize proper lifting technique: lift with your legs, keep your back straight and the load close to the body. Utilize mechanical means to move materials when possible. • Utilize proper hand and body positioning when using hand tools and handling pieces of material for disposal. Ensure that work gloves are worn when using tools or handling materials. • Take breaks as necessary to avoid repetitive motion injuries and muscle strain from using hand tools and vibratory equipment. • When changing out buckets or other heavy equipment attachments ensure the attachment is blocked out, secure and at zero energy state before making the switch. Keep hand and body out of potential pinch point locations. 	M
Placement and compaction of base fill material: <ul style="list-style-type: none"> • Backhoe / loader / skid steer • Dump truck • Smooth drum roller • Vibratory compactor • Hand tools 	<ul style="list-style-type: none"> • Slips, trips, falls • Equipment defects • Pinch points • Struck by • Caught in between • Pedestrian safety • Ergonomic hazards • Manual lifting 	<ul style="list-style-type: none"> • Thoroughly inspect the jobsite and walk the path of travel of for the equipment. Remove or mark potential trip hazards for ground personnel. • Provisions will be made for public protection. Spotters will be utilized for equipment movement and delineation will be installed to discourage unauthorized jobsite access from the public. 	M

	<ul style="list-style-type: none"> Utility contact 	<ul style="list-style-type: none"> Equipment spotters will stay in line of sight of operators and utilize hand signals. Spotters will be utilized for all truck and equipment movement. Recognize the pinch point and struck by hazards created by the movement of heavy equipment. Utilize 3 points of contact when entering and exiting equipment. Never place your body in between equipment and unmovable objects. Thoroughly inspect all heavy equipment and tools for defects or damage prior to use. Water for dust suppression will be obtained from a local fire hydrant and a fire hose will be used to spray water to control dust. Ensure that all dust controls are in place prior to control fugitive dust as needed. Ground personnel will serve as spotters for truck drivers and alert them to pedestrian traffic and ensure that waste bins are staged in appropriate locations. No one person will lift more than 50 pounds without getting help. Utilize proper lifting technique: lift with your legs, keep your back straight and the load close to the body. Utilize mechanical means to move materials when possible. Utilize proper hand and body positioning when using hand tools and handling pieces of material for disposal. Ensure that work gloves are worn when using tools or handling materials. Take breaks as necessary to avoid repetitive motion injuries and muscle strain from using hand tools and vibratory equipment. When changing out buckets or other heavy equipment attachments ensure the attachment is blocked out, secure and at zero energy state before making the switch. Keep hand and body out of potential pinch point locations. 	
<p>Application of asphalt:</p> <ul style="list-style-type: none"> Asphalt paving machine Smooth drum roller Hand tools Propane torch 	<ul style="list-style-type: none"> Slips, trips, falls Burns Fire Caught in between Pinch points Struck by Ergonomic hazards Pedestrian safety Equipment defects Manual lifting Utility contact 	<ul style="list-style-type: none"> Obtain a hot work permit from the Base Fire Department and ECC prior to any hot work activities. Follow all provisions stated on permit including fire watch duties. Fire extinguisher must be near by Avoid contact with hot surfaces created by the paving machine and hot asphalt. Utilize leather gloves when necessary. If a propane torch is used during the paving process, ensure the tank is secured when use. Turn off valve at tank when not in use. Torch users will wear leather gloves. Only 	M

		<p>ignite torch with handheld sparking device. Thoroughly inspect all hoses, regulators, and torches prior to use.</p> <ul style="list-style-type: none">• Thoroughly inspect the jobsite and walk the path of travel of for the equipment. Remove or mark potential trip hazards for ground personnel.• Provisions will be made for public protection. Spotters will be utilized for equipment movement and delineation will be installed to discourage unauthorized jobsite access from the public.• Equipment spotters will stay in line of sight of operators and utilize hand signals. Spotters will be utilized for all truck and equipment movement.• Recognize the pinch point and struck by hazards created by the movement of heavy equipment.• Utilize 3 points of contact when entering and exiting equipment.• Never place your body in between equipment and unmovable objects.• Thoroughly inspect all heavy equipment and tools for defects or damage prior to use.• Ground personnel will serve as spotters for truck drivers and alert them to pedestrian traffic and ensure that waste bins are staged in appropriate locations.• No one person will lift more than 50 pounds without getting help. Utilize proper lifting technique: lift with your legs, keep your back straight and the load close to the body. Utilize mechanical means to move materials when possible.• Utilize proper hand and body positioning when using hand tools and handling pieces of material for disposal. Ensure that work gloves are worn when using tools or handling materials.• Take breaks as necessary to avoid repetitive motion injuries and muscle strain from using hand tools and vibratory equipment.	
--	--	---	--

Equipment to be Used	Training Requirements	Inspection Requirements
<p>Hand tools: shovels, rakes, propane torches, digging bar</p> <p>Heavy equipment: Backhoe, loader, skid steer, smooth drum rollers, asphalt saws, dump truck, Asphalt paving machine, vibratory compactor, sweeper, dust control equipment</p> <p>Generators and extension cords</p> <p>Applicable safety equipment (delineation equipment, fire extinguisher, etc.)</p>	<p>All workers will be trained on the proper use of tools by employer or as needed to determine competency.</p> <p>Only trained and qualified operators will utilize heavy equipment.</p>	<p>Inspect all equipment tools prior to use for damage. Remove any defective tools or materials from service.</p> <p>Complete a pre-trip inspection of all heavy equipment used on site. Complete ECC Heavy equipment inspection checklist prior to use, each day.</p>

[illegible]

Activity Hazard Analysis (AHA)

Activity/Work Task: Site Restoration- Installation of Topsoil and Seeding		Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: Former Harshaw Chemical Company		Risk Assessment Code (RAC) Matrix					
Contract Number: W912P424C0002		Severity	Probability				
Date Prepared: May 2024			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Robert A. Brooks, CSP, STS-C/Program Health and Safety Manager		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by (Name/Title): Kym Edelman, CIH, CSP/Corporate Safety Director		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Competent Person (Name/Title):		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
		Probability is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart	
Notes: (Field Notes, Review Comments, etc.)		Severity is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E = Extremely High Risk	
		Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H = High Risk	
						M = Moderate Risk	
						L = Low Risk	
PRINCIPAL STEPS	POTENTIAL SAFETY / HEALTH HAZARDS	RECOMMENDED CONTROLS				RAC	
Installation of Topsoil	Vehicle accidents	<ul style="list-style-type: none"> • Drive courteously and defensively; be aware of changing road conditions. • Make sure all tools and materials are properly secured during transport. • Obey all traffic laws. • If tired or sleepy let someone else drive. • Wear seatbelts at all times while in the vehicle. • Do not talk or text on cell phone while driving. 				L	
	Rollovers, overhead utilities, crush hazards during offloading / loading heavy equipment.	<ul style="list-style-type: none"> • Only qualified operators shall load or unload equipment. • Operator certifications shall be maintained in site files. • Ensure overhead utilities are not present. • All personnel shall remain outside the tip zone during offloading. • Use spotters to load/ offload heavy equipment. 				L	
	Overhead/ Underground utilities	<ul style="list-style-type: none"> • Contact Canada DigSafe. Perform survey before operations begin. • Perform survey of area and clearly identify overhead hazards. 				L	

Activity Hazard Analysis (AHA)

Cont. Installation of Topsoil	<ul style="list-style-type: none"> Musculoskeletal Injuries, ergonomic strains 	<ul style="list-style-type: none"> Utilization of mechanical devices will be the first option on all appropriate lifting tasks. Site personnel will be instructed on proper lifting techniques. If manual lifting is required, have proper footing prior to lift. Always determine weight of material/ object prior to lifting. Do not lift more than 50 lbs (22kg) per individual, use two man lift. When lifting, lift with legs, keep back straight and chin up. 	L
	<ul style="list-style-type: none"> Crush, pinch points 	<ul style="list-style-type: none"> All material handling and heavy equipment operations shall take place in pre-determined areas away from pedestrian areas or other operations. Keep body and hands out of swing and turn radius of equipment. Do not get body and or hands/arms in between equipment and or materials. Make eye contact with vehicle operators before approaching/crossing within 25-feet. 	L
	<ul style="list-style-type: none"> Slips, trips falls 	<ul style="list-style-type: none"> Work areas will be visually inspected continuously for signs of poor housekeeping. Identified slip and trip hazards will be removed or guarded prior to beginning work. Appropriate illumination will be maintained on and around the entire work area. The minimum requirement for light required for exterior work is 5 foot-candles). Demarcate all above ground hazards (e.g., stakes, rebar, stub-ups, etc.). Use 3 points of contact when exiting trucks and equipment. 	L
Application of seeding	Falling materials, flying seeding debris	<ul style="list-style-type: none"> Make sure the seeding areas is secured from unnecessary personnel entering the seeding area. 	L
	Slips, trips, and falls	<ul style="list-style-type: none"> Work areas will be continuously inspected for signs of poor housekeeping. Identified slip and trip hazards will be removed or guarded prior to beginning work. Appropriate illumination will be maintained around the entire work area. Portable lights will be used as necessary to maintain a minimum of 5 foot-candles in the work area. Three points of contact must be maintained when climbing on and off of equipment. 	L
	Exposure to vehicular and equipment traffic	<ul style="list-style-type: none"> KEEP UNNECESSARY GROUND PERSONNEL AWAY from seeding areas. Wear reflective, ANSI Type 2 or 3 high visibility garments (e.g., vest, jacket) at all times in work areas. Signs, barricades, flashers, flaggers, and other traffic control devices used in accordance with the Work Plan/Traffic Control Plan. 	L

Activity Hazard Analysis (AHA)

Cont. Application of seeding	General heavy equipment hazards	<ul style="list-style-type: none"> • Only trained and qualified personnel will operate heavy equipment. Subcontractor is responsible for certifying all operators. • Equipment will be inspected before each shift and documented. • Ground personnel/operators will be familiar with appropriate hand signals in the work area. • Only one person will be allowed to direct the operator. • All heavy equipment will be equipped with manufacturer-supplied roll over protection and functional, audible back up alarms. • Personnel are not permitted inside of the swing radius of heavy equipment. • Buckets and other attachments are to be placed on the ground in a zero mechanical state before equipment is shut down. 	L
	Spill and fire control	<ul style="list-style-type: none"> • Adequate spill absorbent will be present at all times. Personnel will be trained in the appropriate use. • All nozzles, hoses, caps, and all other associated wastewater treatment materials will be in good working order and properly secured during wastewater treatment operations • A minimum of one 20lb ABC fire extinguisher will be present at all fuel storage/fueling sites. Appropriate signage shall also be present. • Refueling nozzles will not be equipped with locking mechanisms. The person refueling must maintain hand contact with the nozzle at all times. 	L
	Adverse weather / Temperatures (low) Hypothermia	<ul style="list-style-type: none"> • Monitor local media for up-to-date severe weather forecasts. • Discontinue work during thunderstorms and severe weather events. • Dress accordingly to reduce potential for hypothermia; bring change of clothing if clothing gets wet. • Hydrate throughout the work day. 	L
	Insects, Snakes, Wildlife, Vegetation Exposures	<ul style="list-style-type: none"> • Inspect work areas when arriving for site assessment to identify hazard(s) • Use insect repellent as necessary • Workers with allergies should carry antidote kits, if necessary 	L

Activity Hazard Analysis (AHA)

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
Dump truck Front end loader Excavator Compactor Seeding vehicle Hand Tools	<ul style="list-style-type: none">• Competent Persons: TBD• Only qualified operators are permitted to operate equipment.• Qualifications and competency reviewed by SSHO/Supervisor. Licensed where required by state regulations	<ul style="list-style-type: none">• Receipt by supervisor, SSHO.• Daily by operator or user.

Activity Hazard Analysis (AHA)

[illegible]

Activity Hazard Analysis (AHA)

ACTIVITY/WORK TASK: Demobilization		Overall Risk Assessment Code (RAC) (Use highest code)				M	
PROJECT LOCATION: Former Harshaw Chemical Company							
CONTRACT NUMBER: W912P424C0002		Risk Assessment Code (RAC) Matrix					
DATE PREPARED: MAY 2024		Severity	Probability				
PREPARED BY: (Name/Title): Robert A. Brooks, CSP, STS-C/Program Health and Safety Manager			Frequent	Likely	Occasional	Seldom	Unlikely
REVIEWED BY: (Name/Title): Kym Edelman, CIH, CSP/Corporate Health and Safety Director		Catastrophic	E	E	H	H	M
Notes: (Field Notes, Review Comments, etc.)		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
		Probability: likelihood the activity will cause a Mishap (near miss, incident or accident). Identify as Frequent, Likely, Occasional, Seldom or Unlikely.				RAC Chart	
		Severity: the outcome if a mishap occurred. Identify as Catastrophic, Critical, Marginal, or Negligible.				E = Extremely High Risk	
		Step 2: Identify the RAC (probability vs. severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				M = Moderate Risk	
						L = Low Risk	
Job Steps	Hazards	Controls					RAC
Demobilization <ul style="list-style-type: none"> Forklift for material handling Offloading equipment and materials from trucks Conex box / trailer delivery Aerial lift and scissor lift mobilization Staging of materials Fueling of equipment Temporary electrical panels 	<ul style="list-style-type: none"> Struck by / Pinch Points Slips, trips, and falls Manual lifting Equipment roll over Contact with utilities Falls from aerial lifts Fire Spills Electorcution 	<ul style="list-style-type: none"> Thoroughly inspect all equipment and vehicles for defects before operation. All operators will wear seatbelts. Inspect equipment path of travel for obstructions and uneven terrain to prevent potential equipment tip over hazards. Mark or remove potential trips hazards. Ensure that a spotter is utilized for all equipment use and deliveries. Spotters will maintain communication and line of sight with operators. Operation of equipment shall maintain a safe distance from overhead electrical lines and other utilities. A minimum of 20-ft safe distance shall be maintained for power lines of up to 50 kV. The exact voltage of any power lines will be confirmed prior to start of work. Operators will maintain 3 points of contact while entering and exiting the equipment. All materials will be stored in orderly piles and will be secured when not in use. When mobilizing/demobilizing an aerial lift or scissor lift, fall protection is required. A full body harness, with a static lanyard that is short enough to prevent the operator from being ejected from the basket will be utilized during lift 					M

Cont. Demobilization		<p>operations. Only manufacturer approved anchor points are to be used.</p> <ul style="list-style-type: none"> • All fueling of equipment will occur when equipment is off. Only metal safety cans are to be used for fuel storage and dispensing. A fire extinguisher will be located near all fueling activities. Each fueling location will have a spill kit ready in case of accidental fuel release. • When offloading the trucks/trailer, do not climb on top of loads over 6ft high. Use caution when releasing load straps. • Secure and strap down conex or job trailer after staged. • No one person will lift more than 50 pounds without getting help. Utilize proper lifting technique: lift with your legs, keep your back straight and the load close to the body. • If a tank is used for mass fuel storage, the tank must be double walled and set on a secondary containment that can contain 100% of the fuel in the tank. All above ground fuel storage tanks must be grounded or bonded to metal frame. • Ensure that all temp panel boxes are de-energized under LOTO program before dismantling 	M
-------------------------	--	--	----------

Equipment to be Used	Training Requirements	Inspection Requirements
<p>Forklift, Scissor lift, Aerial lift</p> <p>Hand tools</p> <p>Generators, temporary panel boxes, and extension cords</p> <p>Fuel cans and tanks</p> <p>Applicable safety equipment (fall protection equipment, fire extinguisher, etc.)</p>	<p>All equipment operators will be certified and trained in the safe and competent use of the machines they are operating.</p>	<p>All heavy equipment will be inspected by a competent person before use at the start of each workday. An inspection form will be filled out to verify that the equipment is in good working order.</p> <p>Fall protection to be inspected prior to use</p> <p>Cords and tools to be inspected prior to use</p>

[illegible]

Appendix B

ECC Corporate Environmental, Health and Safety Standard Operating Procedures (Table of Contents)

**(All SOPs are located on ECCs Intranet (ECCONET). Select SOPs are included as
requested in USACE comments)**

This page intentionally left blank.

01 General Administration

EHS-SOP-01-01 EHS Management System Program Overview

EHS-SOP-01-04 Subcontractor Management

02 General Safety

EHS-SOP-02-01 Site Control

EHS-SOP-02-02 Hazard Evaluation- Job Safety Analysis

EHS-SOP-02-03 Mobile Construction Equipment

EHS-SOP-02-05 Fall Prevention and Protection

EHS-SOP-02-06 Stairways and Ladders

EHS-SOP-02-07 Electrical Safety

EHS-SOP-02-08 Hand and Power Tools

EHS-SOP-02-09 Fire Protection

EHS-SOP-02-10 Hazard Communication

EHS-SOP-02-13 Back Injury Prevention

EHS-SOP-02-14 Scaffolds

EHS-SOP-02-15 Management Safety Inspections

03 Personal Protective Equipment

EHS-SOP-03-01 Personal Protective Equipment

EHS-SOP-03-02 Respiratory Protection

04 Permit-Required High Loss Potential Activities

EHS-SOP-04-01 Confined Space Entry

EHS-SOP-04-02 Hot Work

EHS-SOP-04-03 Control of Hazardous Energy (LO/TO)

EHS-SOP-04-04 Line Breaking

EHS-SOP-04-05 Hoisting and Crane Operation

EHS-SOP-04-06 Underground Utilities

EHS-SOP-04-07 Excavation

EHS-SOP-04-09 Working Over or Near Water

EHS-SOP-04-10 Diving Management Plan

05 Occupational Health

EHS-SOP-05-02 Medical Surveillance

EHS-SOP-05-03 Bloodborne Pathogens

EHS-SOP-05-04 Cold Stress Prevention

EHS-SOP-05-05 Heat Stress Prevention

EHS-SOP-05-06 Hearing Conservation

EHS-SOP-05-07 Air Monitoring

EHS-SOP-05-09 Asbestos Abatement

EHS-SOP-05-10 Lead Remediation

EHS Guidelines

EHS-Guideline 04-11 Demolition

EHS Guideline 02-16 Heavy Equipment Decontamination

EHS Guideline 05-08 Biological Hazards

This page intentionally left blank.

Appendix C

EHS Forms

(Forms are located on ECCs Intranet (ECCONET) under the procedure base.)

This page intentionally left blank.

Sample Project Health and Safety Forms

<u>1.0</u>	<u>PERSONNEL AND TRAINING FORMS</u>	<u>13</u>
<u>2.0</u>	<u>WORK PERMITS/PLANS.....</u>	<u>20</u>
<u>3.0</u>	<u>INSPECTION CHECKLISTS</u>	<u>25</u>
<u>4.0</u>	<u>INDUSTRIAL HYGIENE FORMS</u>	<u>37</u>

1.0 PERSONNEL AND TRAINING FORMS

APP Compliance Agreement
AHA Training Documentation
Emergency Data Sheet
Equipment Operator Qualification Form
Daily Tailgate Safety Meeting


	<p align="center">Environmental Chemical Corporation</p>	<p align="center">ACCIDENT PREVENTION PLAN COMPLIANCE AGREEMENT</p>
---	---	--

Project:

I have received a summary of the information on the contents of the Accident Prevention Plan for the Project _____, including operations to be performed, site hazards, safety requirements, use of personal protective clothing and equipment, monitoring requirements, site control, decontamination procedures, and actions to take in the event of a site emergency. Copies of this plan are available for my review.

I have been briefed on the contents of the plan, understand its requirements, Section 8.26 and Appendices.. I agree to comply with all of its provisions. I understand that failure to comply with these requirements could result in disciplinary action.

NAME	SIGNATURE	EMPLOYER	DATE

	Environmental Chemical Corporation	ACTIVITY HAZARD ANALYSIS TRAINING DOCUMENTATION
---	---	--

Project Name: _____

Activity Hazard Analysis Review AHA Title: _____	
By signing below, I agree to the following: <ul style="list-style-type: none"> ▪ I agree to follow the work steps and implement the controls as written. ▪ I agree to stop work when conditions or hazards change or when I encounter unexpected conditions during the execution of work, or when work cannot be performed as written, or instructions become unclear during execution. ▪ I am qualified and fit to perform the work. 	
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)
Worker (Print / Signature / Date)	Worker (Print / Signature / Date)



Vision
Integrity
Results

ENVIRONMENTAL CHEMICAL CORPORATION

EMERGENCY DATA SHEET

The purpose of the Emergency Data Sheet is to provide a mechanism for employees to voluntarily disclose personal information that may be of assistance to project and emergency response personnel in the event of an emergency. This data sheet should be kept in a secure location to protect the privacy of the employee, yet should be readily available to appropriate personnel during an emergency situation. Return completed form to project safety representative and update this data sheet as often as necessary to maintain its accuracy. This may include changes in medication, emergency contacts or allergies and sensitivities.

Name:

Date:

Address:

Optional:

Age:

Height:

Weight:

Home Telephone:

Work Telephone:

Name and Telephone Number of Person(s) to be Contacted in the Event of an Emergency:

Medications Currently Taking (both prescribed and over-the-counter medication):

Known Allergies or Sensitivities (such as allergic reaction to bee stings and food allergies):

Other Significant Medical Alerts or Precautions:

Name of Personal Physician:

Telephone No.:

Implementation Project:


Supervisor's Name:

Task:

Supervisor's Title:

Company/Department:

Telephone Number:

	Environmental Chemical Corporation	EQUIPMENT OPERATOR QUALIFICATION FORM
---	---	--

Project: _____

OPERATOR NAME: _____

Equipment Type	Supervisor to Initial *							Approval to Operate Equipment
	Cert	Manual	Controls	Safety	Operate	Insp/Maint	Fuel	Authorizing Name / Signature

* Supervisor to initial when Operator has successfully demonstrated appropriate qualifications in each area:

- Cert = Operator has necessary certifications (e.g., crane, forklift)
- Manual = Operator is familiar with the applicable operating manual
- Controls = Operator is familiar with the operating controls for the equipment
- Safety = Operator is familiar with the safety devices
- Operate = Operator used equipment in a safe, qualified manner in the field

- Insp/Maint = Operator is familiar with the appropriate daily inspection and maintenance requirements
- Fuel = Operator is familiar with the proper fueling procedures

Basic Operator Qualification Requirements

- Only qualified and trained equipment operators are allowed to operate equipment.
- Equipment shall be operated in accordance with the manufacturer's operating manuals and warnings.
- Equipment shall not be modified unless written permission has been obtained from the manufacturer.
- Inspect all equipment before use. Do not operate equipment with damaged safety equipment. Red tag equipment that is unsafe.
- Use a spotter when operating in tight spaces or where operator cannot see adequately.
- Equipment shall not be operated in a manner which endangers personnel or other equipment.
- Follow posted speed limits, and reduce speed when weather or other conditions require.
- Getting on or off equipment shall be done facing the equipment with three points of contact and only when the equipment is fully stopped.
- Use safety devices that are provided (this includes seat belts, engine guards, alarms, steps, hand holds, etc.).
- Lower buckets, arms, blades, and any other hydraulic parts/attachments when stopped; do not leave unattended machines running.
- Whenever equipment is parked, it shall have the brake(s) set and wheels chocked. Equipment with buckets/blades set on the ground does not need to be chocked.
- Load capacity ratings shall not be exceeded at any time.
- While operating equipment, report use of prescription drugs. Do not take any drugs which will impair your ability to operate the equipment.
- Wear hearing protection above 85 dBA (if you must raise your voice to be heard at a distance of three feet or less)



Date: _____

Subjects Discussed: _____

Name

Signature

Date

[illegible]

2.0 WORK PERMITS/PLANS

Confined Space Entry Permit

Hot Work Permit

Line Breaking Permit

Lift Plans



Form Number:
Title:

ESQ-6.1.02
Site Confined Space Entry Permit

CONFINED SPACE ENTRY PERMIT

PERMIT VALID FOR ONEONE SHIFT OF 12 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

DATE: SITE LOCATION and DESCRIPTION:

PURPOSE OF ENTRY:

ENTRY SUPERVISOR:

COMMUNICATION PROCEDURES:

RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM):

REQUIREMENTS COMPLETED	YES	NO	N/A	REQUIREMENTS COMPLETED	YES	NO	N/A
Lock Out/De-energize/Try-out, Line(s) Broken-Capped-Blanked				Emergency Escape Retrieval Equip in place, inspected, and tested			
Purge-Flush, Drain and Vent				Rescue Team Notified			
Mechanical Ventilation				Fire Extinguishers			
Secure Area (Post and Flag)				Lighting (Explosive Proof)			
Monitoring Instruments Calibrated				Ladder inspected			
Breathing Apparatus				Hot Work Permit Issued			

Protective Clothing (Specify below)

Respirator (Specify Below)

RECORD CONTINUOUS MONITORING RESULTS EVERY 15 minutes. CONSULT WITH ESQ MANAGER FOR ADDITIONAL AND/OR MORE FREQUENT MONITORING REQUIREMENTS. ORDER OF MONITORING IS O2, LEL, TOXICS

INSTRUMENT(S) USED	MODEL &/or TYPE	SERIAL &/or UNIT #
--------------------	-----------------	--------------------

Test	Limits	Reading	Time	Reading	Time	Reading	Time	Reading	Time
OXYGEN %	<19.5 or > 23.5%								
LEL %	5								
CARBON MONOXIDE ppm	25								
HYDROGEN SULFIDE	5								
Volatile Organic Compounds (as measured by PID) (Enter site-specific Limit) ppm									
Sulfur Dioxide ppm	2								
Ammonia ppm	25								
Hydrogen Cyanide ppm	4								

REMARKS:

POSITION	NAME	SIGNATURE
SUPERVISOR		
ATMOSPHERE TESTER		
ENTRANT		
ENTRANT		
ATTENDANT		
RESCUE TEAM		PHONE#
PERMIT CLOSED BY (SUPERVISOR SIGNATURE):		TIME:



HOT WORK PERMIT

NOTE: PERMIT VALID ON DAY OF OPERATION AT ONE LOCATION ONLY

Issued by: _____ Location: _____ Date: _____

Type of Work: ☐ Cutting ☐ Welding ☐ Other: _____

Start Time: _____ Permit Expiration Time: _____

Operators: Name(s): _____ Signature(s): _____

Fire Watch (stay on duty a minimum of 60 minutes after all completion of activities; monitor for 1-3 hours):

Name: _____ Signature: _____

If the hot work is in a confined space or near the process equipment handling combustible materials, Oxygen and LEL readings should be recorded every 15 minutes

Hot Work Requirements Checklist

	<u>Yes</u>	<u>No</u>	<u>N/A</u>		<u>Yes</u>	<u>No</u>	<u>N/A</u>
General – Remove Combustibles within 35 Feet				Work in or on Buildings			
Appropriate fire extinguishers are staged in the work area.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Construction is non-combustible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel trained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Combustibles on other side of walls, ceilings, roofs moved away	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hot Work equipment has been inspected and is in good repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Work on or in Enclosed Equipment (Pipes, vessels, etc.)			
Emergency communications available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment internals inspected and cleaned of combustibles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flammable liquids, dusts, lint and oil removed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment properly isolated or air gapped from other sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Atmosphere tested and flammable vapors eliminated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment purged of flammable liquids and gases, and tested inside	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Floors swept clean	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pressurized equipment removed from service, isolated, vented and locked out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Combustible floors wet down or covered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Confined space entry permit issued including mechanical ventilation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All wall and floor openings covered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire Watch			
Fire resistant tarps suspended beneath overhead work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire watch posted during and for at least 60 minutes after hot work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protect or shut down ducts and conveyors that could carry sparks away from immediate area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hot work to finish one hour before shift end, and monitoring will occur for at least one hour after hot work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PPE is appropriate for task, including lens shade, FR clothing, gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire watch trained in duties and fire extinguisher use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Welding screen in place to protect passersby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fire watch posted for adjoining areas, above and below	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other Precautions Taken (Describe) _____

Emergency Contact: _____

All pre-hot work requirements have been met.

Supervisor Name: _____ **Signature:** _____



Form Number: ESQ-7.4.01
Title: Line Breaking Permit

LINE BREAKING PERMIT

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

DATE: _____ SITE LOCATION and DESCRIPTION OF LINE: _____

PURPOSE OF LINE BREAK: _____

SUPERVISOR: _____

COMMUNICATION PROCEDURES: _____

RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM): _____

PREPARATIONS COMPLETED	YES	NO	N/A	HAZARDS DISCUSSED WITH CREW	YES	NO	N/A
Pre-task Meeting Held				Flammable gas or liquid			
Line section identified and isolated				Toxic or corrosive gas or liquid			
Emergency procedures planned				Pressure/vacuum			
Secure Area (Post and Flag)				Hot material			
Standby personnel assigned				Other (describe):			
Communications plan reviewed							

SPECIAL INSTRUCTIONS

Note: No hot cutting permitted on lines that may have contained flammable, combustible or toxic materials

Check Yes No			Check Yes No		
		Chemical Protective Coveralls			Standby Person
		Acid Suit			Pump Locked Out
		Acid Hood			Valves Closed and Locked Out
		Rubber Boots			System Vented, Drained, valves open
		Goggles			System flushed
		Face Shield			Containment for Residual Liquid
		Hot Suit			Fire Extinguisher
		FR Clothing			Water Hose Ready and Charged
		Rain Suit			Blanks to be Installed
		Gloves (describe):			If Valve to be removed, opened/closed, opened/closed to move plug, relieve pressure
		Special Shielding			Grating, Floor Openings Covered
		Respirator - Full Face Half Face (circle)			Piping Support Installed/Needed
		Cartridge (describe)			Spark-Proof Tools
		Approved SCBA worn ready			Barricade, ___Radius (Above / Below)
		Radio cell phone fire alarm (circle)			System less than 140°F
					Other

POSITION	NAME	SIGNATURE
SUPERVISOR		
CREW MEMBER		
CREW MEMBER		
ATTENDANT		
RESCUE TEAM		PHONE#
PERMIT CLOSED BY (SUPERVISOR SIGNATURE):		TIME:

HOISTING AND RIGGING CRITICAL LIFT PLAN

Describe the Load:	Date of Lift:
	Location:
	Name of Rigger:
	Name of Spotter :
Calculated Lift Weight:	Name of Operator :
Taylor Forklift Capacity:	Center of Gravity Location:
Rigging <u>Sling Selection:</u> <ul style="list-style-type: none"> Type of Sling – _____ Number of slings to hook up – _____ Sling Size – _____ Sling Length – _____ Rating capacity of sling – _____ 1.0 Rigging Accessories (i.e eye bolts) <ul style="list-style-type: none"> Type _____ Capacity _____ Number of Attachments _____ Spreader Bar _____ 	Other Hazards <ul style="list-style-type: none"> Required utility line clearance _____ Obstructions which could interfere with the lift: Sling Hitch Arrangement (complete for configuration used) Basket Hitch weight capacity _____ Vertical Hitch weight capacity _____ Choker Hitch weight capacity _____
Location of Lifting points:	Special Rigging Requirements:
Maximum allowable sling angle (measured from horizontal):	Required Softening Material:
Tag line location :	Stop Points:

2.0 This section is for Boom Cranes

Swing Direction and Degree	Length of Boom	Angle of Boom
Rated lift capacity or boom length and angle <ul style="list-style-type: none"> Over Rear _____ Over Side _____ Over Front _____ 	Center of Load to Crane Center Pin	Special Precautions (ground condition, weather conditions)

Diagram Lift (use back of form)

Signature of Lift Supervisor: _____

CERTIFICATE OF COMPLIANCE	
This certificate shall be signed by an official of the company that provides cranes for any application under this contract. Post a completed certificate on each crane brought onto Navy property.	
<u>CONTRACTING OFFICER'S POINT OF CONTACT</u> (Government Representative)	PHONE
PRIME CONTRACTOR/PHONE	CONTRACT NUMBER
CRANE SUPPLIER/PHONE (if different from prime contractor)	CRANE NUMBER (i.e., ID number)
CRANE MANUFACTURER/TYPE/CAPACITY	
CRANE OPERATOR'S NAME(S)	
<p>I certify that</p> <ol style="list-style-type: none"> 1. The above noted crane and associated rigging gear conform to applicable OSHA regulations (host country regulations for naval activities in foreign countries) and applicable ASME B30 standards. The following OSHA regulations and ASME standards apply: _____ 2. The operators noted above have been trained and are qualified for the operation of the above noted crane. 3. The operators noted above have been trained not to bypass safety devices during lifting operations. 4. The operators, riggers and company officials are aware of the actions required in the event of an accident as specified in the contract. 	
COMPANY OFFICIAL SIGNATURE	DATE
COMPANY OFFICIAL NAME/TITLE	
POST ON CRANE (IN CAB OR VEHICLE)	

3.0 INSPECTION CHECKLISTS

Deficiency Tracking Log
Construction Equipment Checklist
Weekly Vehicle Inspection Checklist
Aerial Lift Daily Inspection Form
Daily Excavation and Trench Inspection
Soils Classification Worksheet
Stationary Scaffold Inspection Checklist
Site HS Inspection Form




*Vision
Integrity
Results*

**Environmental Chemical
Corporation**

DEFICIENCY TRACKING LOG

Date	Deficiency	EM 385-1-1 / OSHA / Spec Reference	Responsible Party	Requested Resolution Date	Actual Resolution Date	Resolution Verified By:

 <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> Vision Integrity Results </div>	Environmental Chemical Corporation	CONSTRUCTION EQUIPMENT INSPECTION CHECKLIST
PROJECT/TASK:		COMPANY:
DATE:	TIME:	M T W Th F Sa Su <small>(Circle One)</small>
Incoming: (Check One)	Outgoing: (Check One)	Daily Insp. (Check One)
Make/Description:		Model:
I.D. No:		
Inspected By: (Print Name and Signature)		
EQUIPMENT	Acceptable	Not Acceptable
	N/A	COMMENTS AND ACTION TAKEN
Operation/Owner's Manual		
Brakes		
Brake Lights		
Reverse Signal Alarm		
Horn/Air Horn		
Tires/Tracks		
Steering		
Seat Belt		
Operating Controls		
Fire extinguisher		
Lights		
Defroster		
Mirrors		
Instruments		
Coupling Devices		
Tailgate and latch		
Bed Cargo area		
Tarp/covers		
Windshield Wipers		
Windshield/Window Glass		
Mudflaps/Rock guards		
Exhaust Systems		
Hitches and Safety Cables		
Hydraulic Lines/ Air Hoses		
Engine Oil Level		
Hydraulic Oil Level		
Rollover Equipment		
Cleanliness		
Odometer: Hours: Comments:		



Vision
Integrity
Results

Project: _____
WEEKLY VEHICLE INSPECTION CHECKLIST
(Pickup Trucks and Utility Vehicles)

PROJECT/TASK:

COMPANY:

DATE:

M T W Th F Sa Su

(Circle One)

Type of Inspection: (Check One) ☐ **Weekly** ☐ **Incoming** ☐ **Outgoing**

Make/Description:


Model:

I.D. No:

Inspected By: (Name and Signature)

EQUIPMENT	Acceptable	Not Acceptable	N/A	COMMENTS AND ACTION TAKEN
Emergency Evacuation Binder				
Brakes				
Brake Lights				
Reverse Lights				
Horn				
Tires				
Spare Tire				
Seat Belt				
Company Placards				
Fire extinguisher				
Lights				
Defroster				
Mirrors				
Instruments				
Eye Wash				
Tailgate and latch				
Steering				
Windshield Wipers				
Windshield/Window Glass				
Mud flaps				
Exhaust Systems				
Hitch				
Battery				
Engine Oil Level				
Transmission Fluid				
First Aid Kit/Trauma Kit				
Cleanliness				
Comments:				Fuel Level: ¼ ½ ¾ F Odometer:

Noted deficiencies must be approved by the Superintendent and/or Health and Safety Officer prior to operation. This inspection form is to be filled out at the start of the work shift upon deliveries by the Equipment/Truck Operator to ensure that the equipment/truck is safe to operate and is free from apparent damage, which could cause failure while in use. Once completed, this form is to be given to the Site Superintendent or Safety Officer to be kept on file on-site. In all cases, consult the manufacturer's data to ensure compliance with all inspection criteria, which may not be indicated

	Environmental Chemical Corporation	AERIAL LIFT DAILY INSPECTION FORM		
PROJECT/TASK:		COMPANY:		
DATE:		M T W Th F Sa Su <small>(Circle One)</small>		
Type of Inspection: <small>(Check One)</small> <input type="checkbox"/> Daily <input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing				
Make / Description:		Model:		
ID/SN:				
Inspected By: (Print Name)				
INSPECTION POINT	Acceptable	Not Acceptable	N/A	COMMENTS AND/OR CORRECTIVE ACTION TAKEN (name/date)
FLUID LEVELS				
Hydraulic Oil				
Fuel				
Battery				
Crankcase Oil				
Coolant				
TIRES				
Wear / Cuts				
Pressure				
LEAKS				
Hydraulic				
Fluid Lines				
Fittings				
ELECTRICAL				
Harness				
Connectors				
Circuits				
5° SLOPE SENSOR				
Indicator Light				
Alarm				
ROTATION GEAR BOX				
Ring Gear Bolts				
Lock-Strips				
LOOSE/MISSING PARTS				
EXCESSIVE WEAR				
WELD CRACKS				
DENTS / DAMAGE				
OPERATIONS				
Boom Controls				
Drive Forward				
Drive Reverse				
Brakes				
BODY HARNESS / LANYARD				
Comments:				Hour Meter:

Noted deficiencies must be approved by the Superintendent and/or Health and Safety Officer prior to operation.



**Environmental
Chemical Corporation**

**DAILY EXCAVATION /
TRENCH
INSPECTION**

Location: _____ Date: _____ Time: _____

A daily inspection of each excavation / trench is required before the start of each shift involving work at that location; after every rainstorm; after other events that could increase hazards (snowstorm, rain, windstorm, thaw); when fissures, cracks, or sloughing occur; when there is a change in the size, location, or placement of the spoil pile; throughout the shift as needed; and prior to any individuals entering the excavation / trench.

Observation/Issue	Y/N/NA	Comments/Required Action
Has it rained or snowed since the last inspection?		
Are the sidewalls/slopes intact?		
Are there tension cracks in the sidewalls, slopes, or surfaces adjacent to the excavation?		
Are there creaking or popping sounds?		
Is equipment located a safe distance from the excavation?		
Has equipment caused sloughing of surface soils?		
Are changes apparent in wall slope, bulges, sloughing, seepage, boiling?		
Are employees protected from loose rock and soil?		
Are warning vests worn by employees exposed to traffic?		
Is there standing water or water accumulation?		
Are employees prohibited from working on the faces of the slope?		
Is air monitoring required? Describe.		
Are controls in place to control/divert surface water in the excavation?		

Competent Person / Inspector's Signature: _____

SOILS CLASSIFICATION WORKSHEET

The following worksheet outlines the visual and manual tests that the competent person must perform at least once, and each time soil conditions change. At least one visual and one manual test must be performed; however, performing several tests is recommended so that the condition of the excavation is thoroughly examined.

Project Name: _____

Project Number: _____

Date: _____

Time: _____

From where was the sample taken? _____

I. Visual Tests: <i>One or more visual tests are required for each classification and each time conditions change</i>			
1. Estimate range of particle sizes:	a.	primarily fine-grained = cohesive material	
	b.	primarily coarse-grained = granular material	
2. Observe excavated soil:	a.	clumps = cohesive material	
	b.	breaks up easily = granular material	
3. Observe sides and adjacent surface area of opened excavation:	a.	crack like openings = fissured material	
	b.	soil spills off vertical sides = possible fissured material	
4. Previous excavation activities:	a.	previously disturbed soil	b. not previously disturbed soil
5. Observe opened side of excavation:	a.	layered systems	b. layers sloped towards excavation
	c.	estimate degree of slope of layers:	
6. Water condition:	a.	evidence of surface water	b. water seeping from sides
	c.	depth of water table:	
7. Vibration present:	a.	Area adjacent to excavation	b. Area within excavation
II. Manual Tests – <i>One or more manual tests are required for classification and each time soil conditions change</i>			
1. Plastically – soil is cohesive if following is true:	a.	mold soil samples into a small ball	
	b.	roll ball into thread 1/8-inch in diameter	
	c.	pick up a 2-inch length of 1/8-inch thread by one end without breaking	
2. Dry Soil Strength:	a.	crumbles on its own or with moderate pressure = granular	
	b.	falls into clumps which break into smaller clumps that are only broken with difficulty = clay with gravel, sand, or silt.	
	c.	breaks into clumps which do not break into smaller clumps and can only be broken with difficulty with no visual indication of fissures = unfissured.	
3. Thumb penetration test: <i>(These tests are to be run on a large clump of material as soon as it is excavated).</i>	a.	can be easily indented by the thumb but penetrated by thumb only with great effort = Type A	
	b.	easily penetrated several inches by thumb and molded by light finger pressure = Type C	
4. Unconfined Compressive Strength: <i>(Saturated Soil Needed)</i>	a.	Pocket Penetrometer reading (tons per square foot/tsf): take 10 readings and average) 0 – 0.5 = Type C; >0.5 – <1.5 = Type B; ≥1.5 = Type A	
	b.	Shear Vane reading (corrected by scale factor if necessary) tsf: 0 – 0.5 = Type C, 0.5 – 1.5 = Type B, 1.5 – 2.0 = Type A	
5. Drying Test: <i>(A dry soil sample 1" thick X 6" diameter is needed)</i>	a.	develops cracks = fissured material	
	b.	dries without cracks and breaks by hand with considerable force is indicative of significant cohesive content = unfissured cohesive material	
	c.	sample breaks easily by hand = fissured cohesive or granular material	
	d.	dry clumps easily pulverized by hand or by stepping on them = granular	
	e.	dry clumps do not pulverize easily = fissured cohesive.	
Soil Classification:	Type A	Type B	Type C
			Stable Rock Other _____
Competent Person:	_____	_____	_____
	Print Name	Signature	Date



Vision
Integrity
Results

**Environmental
Chemical Corporation**

**STATIONARY SCAFFOLD
INSPECTION CHECKLIST**

PROJECT:

LOCATION:

SCAFFOLD TYPE:

DATE OF INSPECTION:

INSPECTOR: PRINT NAME:

INSPECTOR: SIGN NAME:

	Yes	No	NA	COMMENTS
All scaffold materials and components in safe condition; all planking is graded for scaffold use.				
Brackets, couplers, nuts, bolts are tight.				
Maximum intended load is _____ pounds. Scaffold capable of supporting 4X intended load.				
A designated Competent Person is in charge of scaffold erection, inspection, use, and dismantlement.				
Vertical posts/uprights bear on firm foundations; mud sills and base plates (when used) are properly placed and are of adequate size.				
Screw jacks used to level and plumb scaffold instead of unstable objects such as blocks, bricks, etc.				
Scaffold platforms are level, posts are plumb.				
Toprails and midrails are in place at work area.				
Toe boards (3.5 inches high) are present for falling object protection and are properly secured.				
Guardrails in place at all open ends.				
Proper access provided for platforms >2 feet above ground. Crossbraces are not used as a means of access.				
Scaffolds >4:1 (height:base width) are secured, tied to structure at least every 30' horizontally and 26' vertically.				
Free standing towers are guyed or tied every 26' in height.				
Scaffold is free of makeshift devices or ladders to increase height.				
Appropriate distance maintained from powerlines: scaffold, workers, and the equipment being used.				



**Environmental
Chemical Corporation**

SITE H/S INSPECTION FORM

Page 1 of 4

Site Information:

Project Name:	Date of Inspection:
Company(s):	Type of Inspection: <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Quarterly
Tasks or Activities Observed:	

Persons Conducting Inspection:

Name	Company	Name	Company

A. General Workplace Conditions

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Walking/Working Surfaces		
Aisles and Passageways		
Platforms/Scaffolding		
Ladders		
Stairs		
Exits/Egress		
Roadways		
Excavations/Trenches		
Ventilation		
Lighting		
Noise Exposure		
Ergonomics		
Potable Water		
Sanitation Facilities		
Temperature Extremes		

B. Hazardous Materials Use & Storage

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
SDSs Available		
Material Labeling		
Storage Conditions		
Storage Containers Condition		
Chemical Storage Compatibility		
Compressed Gas Storage & Use		
Waste Storage/Disposal		



C. Motor Vehicles & Power Equipment

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Seatbelts & Back-up Alarms		
Dozer Equipment		
Scraper Equipment		
Road Grader Equipment		
Excavators		
Water Trucks		
Front End Loader/Backhoe Equip.		
Cranes/ Hoists & Rigging		
Forklifts		
Other Heavy Equipment		

D. Hazard Controls

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
General Site Controls		
Work Zone Delineation		
Lockout Systems		
Accident Prevention Signs and Tags		
Barricades		
Hole Covers		
Electrical Grounding & GFCI Use		

E. Emergency Systems

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Emergency Instructions		
Fire Protection		
Eye Wash and Showers		
First Aid Kits/Stations		
Emergency Rescue Equipment		

F. Protective Equipment Use & Compliance

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Eye Protection		
Ear Protection		
Respiratory Protection		
Head Protection		
Hand Protection		
Foot Protection		
Body Protection		
Fall Protection		



G. Hand/Power Tools and Power Systems

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Hand Tools Condition		
Portable Power Tools Condition		
Welding/Burning Equip. Condition		
Power Tools Guarding		
Electrical Power Generator		
Pneumatic Power Generator		

H. Remediation Waste Management

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Waste Properly Categorized		
Cross Contamination Minimized		
Containers in Good Condition		
Waste Storage		
Staging/Stockpiling of Soil/Debris		
Decontamination Water		

I. Project Environmental Programs

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Dust Control		
Odor Control		
Oil and Spill Prevention		
Stormwater/Erosion Control Activities		

J. Environmental Management System

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No
Pollution Prevention		
Recycling		
Paper Conservation		
HS Continual Improvement		
Employee Participation		

K. Other Environmental Safety and Health Conditions or Work Practices

Category	Observations (N/A if Not Applicable)	Action required <input type="checkbox"/> Yes <input type="checkbox"/> No



**Environmental
Chemical Corporation**

SITE H/S INSPECTION FORM

Page 4 of 4

Site Information:

Project Name:

Date of Inspection:

Company(s):

Type of Inspection: ☐ Weekly ☐ Monthly ☐ Quarterly

Summary and Recommendations

Finding Number and Hazard Classification (#/Classification)*	Findings and Recommended Corrective Action	Date Corrected	Corrected or Verified by

*Classify as Major or Minor – Major findings indicate that a potential or imminent hazard to people, property, or the environment exist

4.0 INDUSTRIAL HYGIENE FORMS

Multi-RAE Calibration Log
Heat Stress Physiological Monitoring Form
Personal Exposure Monitoring Report
Air Monitoring Data Sheet



Isobutylene: 100 ppm Lot #: Exp. Date:
4-Gas: CO - 50 ppm; H₂S - 25 ppm; LEL - 50% Methane LEL; Air - Balance
Lot #: Exp. Date:

[illegible]



**Environmental Chemical
Corporation**

HEAT STRESS PHYSIOLOGICAL MONITORING FORM

Project

Company

1. Take and record measurement of temperature and pulse at the following times:
 - a. before beginning shift
 - b. at each break
 - c. at the end of the day
2. Shorten the work cycle if measurements exceed:

Pulse – 110 beats per minute
Temperature – 99.6° F
3. Never continue work if your body temperature is more than 100.4° F, or if you are experiencing sudden and severe fatigue, nausea, dizziness, or lightheadedness.

Employee:	_____	Body Weight:	prework	_____
Date:	_____		postwork	_____

Time							
Temp							
Pulse							

Employee: _____	Body Weight: prework _____
Date: _____	postwork _____

Time							
Temp							
Pulse							

Employee: _____ Body Weight: prework _____
Date: _____ postwork _____


Time							
Temp							
Pulse							

Employee: _____ Body Weight: prework _____
Date: _____ postwork _____

Time							
Temp							
Pulse							

Employee: _____ Body Weight: prework _____
Date: _____ postwork _____

Time							
Temp							
Pulse							

 Environmental Chemical Corporation	PERSONAL EXPOSURE MONITORING REPORT
--	--

Project Name: _____

Employee Name: _____

Date of Monitoring: _____ **Date Analytical Results Received:** _____

Duration of Monitoring: _____ **Date of This Report:** _____

Target Analyte(s) and Exposure Limits (e.g., PEL, TLV):

<i>Analyte</i>	<i>PEL (mg/m³)</i>	<i>TLV (mg/m³)</i>	<i>(Other Limits)</i>	<i>Monitoring Results (mg/m³)</i>

Employee Activity:

PPE Used:

Based on the analytical results, the PEL for this analyte was / was not exceeded.
(Circle one)

Comments:

Signature:

Employee Signature / Date:

**Project Health and Safety Supervisor
Environmental Chemical Corporation**



Vision
Integrity
Results

Environmental Chemical
Corporation

AIR MONITORING DATA SHEET

Page 1 of 2

Company				Project	
Task		Site			Date
Employee					Blank
Job Title					NA
Sample No.					
Pump No.					
Media					
Time On					
Time Off					
Total Time					
Flow Rate					
Volume					
Sample Type					
LABORATORY ANALYSIS	Laboratory Used:			Report Nos. (attach copies)	
	Contaminant	Results	Results	Results	Results
Description of Job Duties and Activities Conducted:					
Continue on separate sheet if necessary					
Control Measures:					
Continue on separate sheet if necessary					
PPE Utilized:					
Continue on separate sheet if necessary					

Air Monitoring Data Sheet

					Calibrator No. and Model:			Page 2 of 2		
Pre-Calibration					POST-CALIBRATION					
Pump No.	1st	2nd	3rd	Average	Pump No.	1st	2nd	3rd	Average	
<i>Chain of Custody</i>										
Relinquished by					Received by			Date & Time		
Relinquished by					Received by			Date & Time		
Relinquished by					Received by			Date & Time		
Relinquished by					Received by			Date & Time		
Additional Information (Diagrams, calculations, other employees represented by the sample)									Pump Check (Time)	
Sampler*:					Signature:			Date:		
Reviewer:					Signature:			Date:		
*Form and calculations completed by sampler unless otherwise indicated.										

Appendix D
Resumes of Key Safety Personnel

This page intentionally left blank.

Yong McGuire, MS, CSP, CIH, CIT

Site Safety and Health Officer

Education/Qualifications:

M.S., Occupational Safety and Health, Columbia Southern University, Orange Beach, AL.

B.S., Physics, Mesa State College, Grand Junction, CO.

Certified Industrial Hygienist (ABIH - cert #11587).

Certified Safety Professional (BCSP - cert. #17238).

Certified Instructional Trainer (BCSP – cert. #13112).

Member of ASSE, Colorado Safety Association, AGC of Colorado, American Industrial Hygiene Association, AGC of America Safety and Health Committee.

Relevant Experience:

Mr. McGuire's background includes an accomplished record of over 20 years of field experience in safety and health and environmental operations. He is a safety professional with experience in construction, renewable energy, radiological, industrial hygiene (IH), oil and gas, and environmental fields. Mr. McGuire is a Certified Industrial Hygienist (CIH), a Certified Safety Professional (CSP), and is a Certified Instructional Trainer (CIT).

RELEVANT EXPERIENCE HIGHLIGHTS

- Over 20 years' experience in environmental safety and health.
- Extensive health and safety experience in construction, renewable energy, radiological, IH, oil and gas, and environmental fields.
- Certifications include CSP, CIH, and CIT.
- Instructor for excavation, fall protection, electrical, and confined space.
- Experienced sampler for PCBs, dust, noise, and mercury and other heavy metals.

Employment History:

Health and Safety Representative, Perma-Fix Environmental Services, Inc. (Perma-Fix), 09/2019–Present. Currently serving as the Lead Safety Manager at the Harborview Medical Research and Training Building. Oversees the cleanup of C-137 contamination, removal of contaminated components, and other construction activities. Duties include being the site COVID-19 subject matter expert (SME), providing guidance on biological hazards, and overseeing the removal and fumigation of bio-safety cabinets (BSCs). Recent duties on other projects include providing safety oversight on the Old Town Demolition (OTD) project at Lawrence Berkeley National Laboratory (LBNL). Construction safety duties included ensuring compliance to California Occupational Safety and Health (CalOSHA) and LBNL requirements. Conducted training as required such as excavation, fall protection, electrical, and confined space. Conducted daily safety observations and submitted reports to LBNL safety. Reviewed and approved all lifting plans for crane work. IH duties included conducting IH sampling for polychlorinated biphenyl (PCB), dust, noise, and mercury and other heavy metals. Submitted samples to a national laboratory and submitted reports to LBNL. As a radiological control technician (RCT), assisted with surveys in relation to shipments of waste going to Nevada National Security Site (NNSS). Performed environmental walk downs and assisted with Stormwater Pollution Prevention Program (SWPPP) inspections.

Site Safety Manager, Substation and Transmission Line Construction, Planet Forward, 10/2018–09/2019. Oversaw the construction of substation, distribution/transmission lines, and bridge installation.

Safety Professional for Contract-Based Projects, 03/2014–10/2018.

- **Lead Safety Manager, AECOM HUNT, LA Rams/Chargers Stadium.** Site Manager for the construction of a bridge, two substations, and installation of 13 miles of transmission line including power poles.
- **Health and Safety Manager; Tesla Manufacturing Plant Expansion; Fremont, CA; Tesla, Fremont CA.** Lead Safety Manager for OEG Electrical contractor. Was the liaison to Tesla safety group, conducted various training including NFPA 70E, fall protection, and aerial lift. Conducted daily jobsite inspections and submitted reports to corporate safety. Reviewed and authorized all energized work permits. Conducted daily safety meeting and assisted in writing job hazard analyses (JHAs) and daily pre-task plans. Assisted supervisors on the proper selection of safety equipment.
- **Health and Safety Representative; Perma-Fix; LBNL, Berkeley, CA.** Provided safety oversight on the OTD project. Construction safety duties included ensuring compliance to CalOSHA and LBNL requirements. Conducted excavation, fall protection, electrical, and confined space training. Conducted daily safety observations and submitted reports to LBNL safety. Reviewed and approved all lifting plans for crane work. IH duties included conducting IH sampling for PCB, dust, noise, mercury and other heavy metals. Submitted samples to a national laboratory and submitted reports to LBNL. Assisted with surveys in relation to shipments of waste going to NNSS. Performed environmental walk downs and assisted with SWPPP inspections.
- **Site Safety Inspector, Liberty Pipeline, Enbridge Oil, Pump Station Construction and Superior Terminal.** Provided project environmental health and safety oversight at several Enbridge oil pipeline pump station construction sites as well as the terminal. Conducted site orientations, was the competent person for pipeline excavation, conducted daily facility audits, conducted incident investigations, wrote daily reports, reviewed crane lifting plans and reviewed subcontractor JHAs to ensure they aligned with Enbridge's safety policy. Worked with other craft inspectors to correct any safety deficiencies noted. Assisted contractors and subcontractors in conducting hazard assessments prior to start of a task. Reviewed deficiencies noted with contractors to discuss possible solutions. Submitted corrections to client. Assisted project managers and supervisors on the completion of required daily supervisor observation forms; consolidated the information and submitted to corporate.

Safety Professional for Contract-Based Projects, 03/2014–10/2018.

Corporate Safety Compliance Manager, Wanzek Construction, 12/2009–02/2014.

- ***Prior position within Wanzek: Division Safety Manager – Wind Power.***
- ***Corporate Safety Compliance Manager.*** Conducted scheduled and impromptu safety audits and inspections on all corporate projects and field offices (wind, solar, oil and gas, industrial, heavy highway). Generated reports and submitted to site management team as well as reported findings to corporate executive management team. Followed up with site management team to ensure discrepancies have been corrected. Site visits included:
 - Audits: Ensured compliance and consistency to company and client policies, OSHA standards, and other local and state regulations. Verified training was up-to-date and documented accordingly.
 - Inspections: Performed jobsite walks to identify unsafe conditions and non-compliant items.
 - Behavior Safety Observations: Ensured employees understood the behavior safety concept and conduct training as needed.

Safety Consultant, Mountain View Wind Turbine, Edison Mission Energy, Amerisafe Consulting, 04/2008–09/2009.

- Conducted OSHA training, schedule, and lead emergency tower rescue drills for each construction site. Trained rescuers on the R500 tower rescue system. Conducted excavation, trenching, and soil mechanics training. Conducted competent person duties for the turbine tower foundation excavations.
- Reviewed contractors JSAs, critical lift plans, and rigging and hoisting plans. Performed daily safety inspections.
- Extensive knowledge in 29 CFR 1926 standards, but especially in fall protection, excavation, electrical, crane, and rigging.
- Led and championed behavior based safety program.

Professional Positions at Various Sites including Goat Mountain Wind Turbine, Edison; Mt. Storm Wind Turbine, Shell/Dominion; West Territory Safety Lead, Trane Commercial Systems; 10/2007–03/2008.

Health and Safety Consultant, Weifield Group (temporary contract for a high profile project), 07/2007–10/2007.

Health and Safety Manager/QA Manager, Gash Electric Company/Gash Mechanical, 02/1999–07/2007. Responsible for restructuring Gash Electric's Health and Safety Program resulting in a dramatic decrease in company's OSHA incidence rate and EMR (from 1.19 to 0.76). Accomplished by performing impromptu field safety inspections, providing loss prevention rules/training in accordance with 29 CFR 1926 and 1910 to all employees, and investigating all accidents and incidents. Managed all aspects of the company's H&S Program.

Health and Safety Specialist; DOE-Rocky Flats Environmental Technology Site; Golden, CO; 06/1997–02/1999.

- Wrote and maintained QA Program (ISO 9001:2000) to ensure compliance to Bechtel (Pueblo Army Chemical Depot) and Kaiser-Hill (Rocky Flats Environmental Technology Site, DOE) QA Program. Familiar with 10 CFR 851 and EM-385.
- Performed and oversaw lockout/tagout procedures on electrical and mechanical systems.
- Authored health and safety procedures, calibration procedures, JHAs, QA plans, and contingency plans.
- Provided training on 29 CFR 1910.120 8-hour refresher, hazard communication (hazcom), and 30-hour and 10-hour. OSHA Outreach, confined spaces, fall protection, excavation safety, and others.
- Performed various IH duties such as hearing conservation, heat and cold stress, and atmosphere monitoring. Use of various IH monitors such as PID and FID.

Safety Coordinator, Mesa Technical Resources (Contract-Wahpeton, ND), 06/1996–02/1997.

- Performed and oversaw lockout/tagout procedures on electrical and mechanical systems.
- Authored health and safety procedures, calibration procedures, JHAs, QA plans, and contingency plans.
- Provided training on 29 CFR 1910.120 8-hour refresher, hazard communication (hazcom), and 30-hour and 10-hour OSHA Outreach, confined space, fall protection, excavation safety, and others.
- Performed various IH duties such as hearing conservation, heat and cold stress, and atmosphere monitoring. Used various IH monitors such as PID and FID.

Supervising Radiation Safety Officer/Safety Coordinator, Mesa Technical Resources (Contract-Gas Hills, Riverton, WY), 05/1995–02/1996. Former uranium mill tailings site (U.S. Nuclear Regulatory Commission site).

Internship, Radiological Data Reduction and Statistical Analysis, Rust Geotech (DOE-Grand Junction, CO), 01/1995–05/1995.

QA Supervisor, Capco, Inc. (electronic and mechanical manufacturer for DOD), Grand Junction, CO, 04/1991–01/1994. Calibrated all testing instruments traceable to NIST, performed statistical process control and internal audits for DOD, wrote calibration procedures, designed test gauges for manufactured parts, and inspected parts for compliance to ANSI Y14.5. Design Engineer for the Bomb Delay Fuse Assembly (U.S. Army).

Supervising Nuclear Mechanical Operator, U.S. Navy nuclear submarine, 05/1987–01/1991.

Training:

- Cardiopulmonary Resuscitation (CPR)/First Aid.
- Blood Borne Pathogens
- OSHA 30-Hour Construction/General Industry.
- Hazardous Waste Operations, 40-Hour OSHA 29 CFR 1910.120 and 8-Hour Refresher.
- Radiological Worker II.
- Authorized Trainer for OSHA 30-Hour and 10-Hour Construction Safety Outreach Training, 29 CFR 1926– OSHA Training Institute.
- Authorized Trainer for OSHA 30-Hour and 10-Hour General Industry Outreach Training 29 CFR 1910 – OSHA Training Institute.
- Certified Instructor for Trenching, Excavating, and Soil Mechanics (Competent Person Training) – OSHA Training Institute.
- Authorized Trainer for Scaffolding – OSHA Training Institute, Red Rocks Community College, Lakewood, CO.
- Certified High Angle Rescue Trainer (Wind Turbine Emergency Rescue) – Capital Safety.
- Certified Adult, Child, Infant CPR/First Aid Instructor – American Heart Association, Medic First Aid.
- Qualified to Conduct Training in Hazardous Waste Operations, 40-Hour OSHA 29 CFR 1910.120 and 8-Hour Refresher.
- Advanced Radiation Safety Officer (RSO) Training – Umetco (Union Carbide).
- Safety Management – AGC of America.
- U.S. Department of Transportation (DOT) Motor Carrier Safety Compliance Seminar – Transportation Safety Institute.
- NCCCO Rigger and Signal Person.
- Integrated Safety Management – Rocky Flats Environmental Technology Site, DOE.
- Radiological Control Technician (RCT) Core Certified – Lawrence Berkeley National Laboratory (LBNL).
- Hazardous Waste Generator, LBNL.
- Waste Accumulation, LBNL.
- National Electrical Code (NFPA 70), Electrical Safety in the Workplace (NFPA 70E), and Hazardous Classified.
- Location (NFPA 497, 499) Seminars – National Fire Protection Association (NFPA).

- Naval Nuclear "A" School, Naval Nuclear Power School, Naval Nuclear Prototype, and Quality Assurance Inspector – USN.
- Stormwater Pollution Prevention Program (SWPPP), LBNL.

Statement of Participation

The Postgraduate Institute for Medicine confirms that

YONG MCGUIRE

has participated in the educational activity titled

CPR/AED: Adult, Child, Infant (BLS) & Standard First Aid

an Internet based activity on 03/28/2024

This educational activity for **6.0** contact hours is provided by the Postgraduate Institute for Medicine.



JOINTLY ACCREDITED PROVIDER™
INTERPROFESSIONAL CONTINUING EDUCATION

In support of improving patient care, Postgraduate Institute for Medicine is jointly accredited by the Accreditation Council for Continuing Medical Education (**ACCME**), the Accreditation Council for Pharmacy Education (**ACPE**), and the American Nurses Credentialing Center (**ANCC**), to provide continuing education for the healthcare team.



American CPR Care Association
We Provide Quality Healthcare



Postgraduate Institute
for Medicine
Professional Excellence in Medical Education

Postgraduate Institute for Medicine
304 Invernewss Way South, Suite 100, Englewood, CO 80112
(303) 799-1930 | (303) 858-8848 Fax

Trace Hutchison, PharmD.

Trace Hutchison, PharmD
Director of Medical Education
Postgraduate Institute for Medicine

The licensee must retain this certificate for a period of 4 years after participating in the course.

GREGORY J. HAYES, CSP

Work Experience

SUMMARY OF EXPERIENCE

Mr. Hayes has over 32 years of Health and Safety (HS) and Quality Control (QC) management experience, serving as Health and Safety Manager and/or Quality Control Systems Manager (QCSM) on a vast array construction and environmental remediation projects. As the HS Manager, Site Safety Health Officer, Mr. Hayes develops and implements, and enforces compliance with project-specific Accident Prevention Plan (APP) and associated health and safety plans and procedures, Activity Hazard Analyses (AHAs), project work plans, and project-specific QC Plans as needed. Mr. Hayes has an extensive background in vertical construction, demolition, and remediation projects. Mr. Hayes is competent in EM385-1-1, OSHA, and EPA standards and regulations.

PROFESSIONAL EXPERIENCE

Health & Safety Manager/QC Officer, ECC, Lakewood, Colorado (1994-Present). Develops, implements, and ensures compliance with project work plans, Environmental Health and Safety and Quality Control plans for new construction, remedial action, and O&M projects. Mr. Hayes has developed and implemented numerous Environmental Health and Safety and Quality Control and Plans for various government clients including USACE, NAVFAC, AFCCE,

Site Safety Health Officer, Hurricane Matthew Building Repairs at AUTECH Andros Island, Bahamas, 31 MM (24 Aug 2021 to Present)

Post pandemic return to AUTECH, Andros Is., Bahamas to continue Hurricane Matthew Recovery contract work. Site Safety Health Officer (SSHO) for work under Navy Facilities Engineering Command (NAVFAC) Southeast includes repair and replacement of perimeter security fencing and fence lighting, repair of roofing systems and building siding systems on thirteen (13) building located at the US Navy AUTECH, Andros Island, Bahamas. Mr. Hayes is responsible for the overall management, maintenance, and enforcement of the project's Accident Prevention Plan regarding the numerous construction activity plans, programs, and procedures.

Site Safety Health Officer, China Lake Berthing Camp, Ridgecrest, CA, 100 MM (09 Nov 2020 – 13 Aug 2021)

Site Safety Health Officer (SSHO) for contract work under Navy Facilities Engineering Command (NAVFAC) Southwest for the construction of a 900 person berthing camp complex in support of a large construction program at the Naval Air Weapons Station China Lake (NAWSCL), Ridgecrest, CA. The scope of work for the NAWS China Lake berthing camp included but not limited to the following: mobilization and site delineation; traffic control; site clearing, grubbing, and grading; site preparation; utility installation and hook-up—electrical, water, sanitary, communication; interior fit-out; appliance and furniture installation; landscaping, hardscape, and demobilization.

As SSHO, Mr. Hayes was responsible for ensuring subcontractor adherence to project APP and AHAs pursuant to EM 385-1-1, OSHA construction and industry standards, CalOSHA standards, Air Quality

Management District jurisdictions, city ordinance, and ECC's COVID-19 project plan including daily questionnaire and thermal screening for all employees.

Mr. Hayes developed, implemented, enforced, and maintained two project APPs (Construction Contract & Services Contract) and their various attachments pertinent to ECC's scope of work: site employee safety orientation training and threatened species (Mojave tortoise) awareness training; monthly exposure hours; incident investigation and corrective actions; cold and heat stress plan; HazCom/GHS; hazardous energy control plan; excavation and trenching plans; site specific fall prevention and site sanitation plan; hot work permits; crane lift plans; employee certification management, and participant in the project's quarterly Client Partnering meetings.

Site Safety Health Officer, Hurricane Florence Recovery Camp Lejeune, NC, 690 MM (01 May 2020 to 22 Oct 2020)

Site Safety Health Officer for work under Navy Facilities Engineering Command (NAVFAC) contract to include the demolition/renovation and restoration of hurricane-damaged buildings including barracks, warehouses, various support buildings; civil work including auto/pedestrian bridge construction, road construction, temporary trailer construction, and roof renovation and repairs. As part of the health & safety team, Mr. Hayes was responsible for ensuring subcontractor adherence to project APP and AHAs, EM 385-1-1, OSHA 29 CFR 1926 for all construction activities including the implementation and management of ECC's COVID-19 project plan including daily questionnaire and thermal screening for all employees.

Site Safety Health Officer, Colorado Convention Center Denver, Colorado, 20 MM Alternate Care Facility Construction April 2020

Site Safety Health Officer for work under Army Corps of Engineers contract to transform the exhibit floors of the Colorado Convention Center into a sub-acute COVID-19 patient Alternate Care Facility. Mr. Hayes was responsible in the management of ECC's super subcontractor Hensel Phelps in the construction of over 1200 patient care spaces, 63 nurse stations, 20 negative air enclosures, modifications to the existing fire alarm system, detection system to comply with NFPA classification for patient care, constructing medical grade air supply to each care space, and water, sewer, and power to each nursing station. The project was executed in three shifts over 19 days maintaining social distancing among contractors. The total manhours for the project were 62,422.8. There were no OSHA recordable or lost time incidents during the project.

Safety monitoring included field activity observations, inspections, safety permitting issuance as well as the implementation and management of the COVID-19 Thermal Screening and Symptom Screening Questionnaires per ECC's COVID-19 project plan.

Site Safety Health Officer, Hurricane Matthew Building Repairs at AUTECH Andros Island, Bahamas (7/25/2018 to 3/19/2020)

Site Safety Health Officer (SSHO) for work under Navy Facilities Engineering Command (NAVFAC) contract (31 MM) to include the demolition of a water tower and repair and replacement of perimeter security fencing and fence lighting, repair of roofing systems and building siding systems on thirteen (13) building located at the US Navy AUTECH, Andros Island, Bahamas. Mr. Hayes is responsible for the overall management, maintenance, and enforcement of the project's Accident Prevention Plan regarding the numerous construction activity plans, programs, and procedures.

Health & Safety Manager, Solar Power Generating Systems Waipio Peninsula, Oahu HI. 35 MM (3/18/2016 to 7/15/2018)

Provided total health and safety management in the construction of a 11-megawatt Photo Voltaic solar farm for Joint Base Pearl Harbor Hickman and nine roof top solar panel installations at various military sites on the Island. Mr. Hayes was responsible for the overall management, maintenance, and enforcement of the project's APP and AHAs for subcontractor activities: excavation, trenching, and backfill for buried conductors and communication lines, concrete pads and utility duct banks; crane lifting operation for transformers, inverters, switch gear; hazardous energy program and arc flash hazard analysis and training; electrical installation testing (hi-pot, megger, continuity, and volt open circuit). Other programs, plans and procedures maintained and trained to throughout the project included Site Specific Fall Prevention Protection plan, HazComm/GHS program, Emergency Action Plan, Blood Borne Pathogen, Spill Plan and Storm Water Pollution Prevention Plan.

Quality Control Systems Manager, Replace Incandescent Lights & Fixtures & HVAC systems at two USACE Project Offices, Mountain Home, AR and Clearwater Lake, Mo. \$1.5 MM (10/2015 to 3/16) As QCSM, Mr. Hayes is responsible for the overall quality control oversight of all subcontractor's work activities based on the USACE QCS/RMS reporting system requirements for the construction of two geothermal loop and heat pump systems. Duties include transmittal/submittal management and updating, conducting three-phase inspections of definable features of work, managing redline and as-built drawings, subcontractor management, monthly progress schedule, and interface with client Quality Assurance personnel.

Health and Safety Alternate, Remediation Services, FUSRAP at Former DuPont Chambers, Deepwater, NJ (9/14 to 9/15). Excavation of 711,876 cubic ft. of radiologically contaminated soils from the AOC's and surrounding areas, monitoring for chemicals during excavations of AOC's. As Site S&H alternate responsible oversight and enforcement of the APP program during the remediation services at the Former DuPont Chambers Plant that included the remediation of various facility sites and load out of rail cars. Ensuring compliance with specified H&S requirements, Federal, OSHA, and NRC regulations, EM385-1, and the APP including. Monitored the remediation of contaminated work sites and collected air and soil samples for VOCs, SVOCs, and heavy metals as well as personnel biological monitoring for blood lead exposures.

Health and Safety Manager/QC Alternate, Energy Improvements and Repairs to Building 92, Portsmouth Naval Shipyard, Kittery, Maine \$13 MM (03/13 – 09/14). Providing safety management and QC oversight of project subcontractors for the Energy Improvement and Repairs at the facilities Structural Steel and Welding Shops, PNSY. Responsibilities included: promote safety; implement and enforce of established safety policy and procedures; provide site orientation and APP training; APP maintenance; review of subcontractor safety programs/plans specific to project (fall protection plans, steel erection plan, scaffolding plan, LOTO, mold and asbestos remediation, excavation), incident investigation and reporting, and maintenance and updates to individual plans (QC, H&S including but not limited to: lock out/tag out program, site specific fall prevention and protection, hazardous energy outage schedule, hot work permits, and daily/weekly safety inspections.

Health and Safety Manager, PPDR & C&D Demo and Transfer to TSS, New York, \$19 MM (01/13-02/13). Provided health and safety oversight for various subcontractors on the Hurricane Sandy clean-up mission on Staten Island, NY. Conducted daily tailgate meetings, safety training/record keeping, incident report investigation, and air monitoring during debris removal and cleanup, confined space entry permitting.

Health and Safety Manager, Sydney Tar Ponds, Nova Scotia, Canada 70 MM (07/11-12/12). Project involved the remediation of pond contaminants (Level C) and the construction of a harbor channel. Mr.

Hayes was responsible to the overall management, maintenance, and enforcement of the project's health and safety program including individual safety plans and procedures (confined space, site specific fall prevention protection, hazardous energy, steel erection, small tool use, heavy equipment and trucking plans, etc.) training/record keeping requirements, and personal and environmental monitoring sample collection and interpretation of results for the project's contaminants of concern. Mr. Hayes delegated his responsibilities to a safety and sampling technician. Mr. Hayes provided daily tailgate safety talks, conducted daily safety inspections and weekly walk through inspections with site personnel, and performed the duties of the safety liaison for the site's Joint Occupation Health & Safety Committee.

Site Manager, Hazardous Waste Piles Removal, Denver Federal Center, Colorado (06/10-01/11).

Provided QC oversight on project to excavate, transport and dispose of three soil mounds (120,000 cy) containing hazardous materials (asbestos) in level C PPE. Implemented three-phase QC inspection process including daily and weekly QC reports. Reviewed construction plans, H&S plans, various standard operating procedures (SOPs), Activity Hazard Analyses (AHAs), and other related plans. Provided QC oversight to ensure the extent of the mound material was excavated and to ensure subcontractors' work was performed in accordance with the statement of work, specifications, all related Federal, State, and local regulations, and SOPs. Worked with surveyor to determine quantities excavated and processed, and reported information to client daily. Conducted final inspections of completed work and directed third-party oversight subcontractor to conduct final clearance inspection/sampling. Provided QC of third-party oversight subcontractor to ensure grids (50 feet by 75 feet) were inspected and clearance soil samples were collected/analyzed. Interpret results of visual inspections and clearance sampling of grids. Cleared grids after passing clearance testing. Implemented and maintained the project's Stormwater Pollution Prevention Plan (SWPPP) including filing Notice of Intent (NOI) and Notice of Termination (NOT), and conducted weekly inspections. Provided QC and tracked waste loads by manifest and weigh tickets, and tracked total tonnage excavated and hauled offsite. Worked with the landfill subcontractor, managed the waste characterization and profiling. Collected samples and interpreted results. Oversaw site access.

Site Safety Health Manager and Quality Control Systems Manager, Centerville Beach Ferndale, California, NAVFAC SW (8/09-3/10). Provided project management oversight and implementation/enforcement of the project's quality control and health and safety programs during the demolition and restoration of the Navy's Centerville Beach facility. Provided three phases of quality control with preparatory and initial inspection meetings, and daily follow up inspection reports for each definable feature of work and provided QC for: waste manifesting and tracking of the transportation and disposal of building contaminants (asbestos, mercury switches, fluorescent light bulbs, PCB ballasts, low rad smoke detectors), building materials recycled, and the PCB and TPH excavation activities; backfill and restoration of the 30 acre site; and was the client and caretaker's point of contact for the site. Implemented the project's Sampling and Analysis Plan and collected confirmation soil samples from excavation sites and performed XRF insitu sampling of Pb soils. Provided health and safety management of subcontractor: performed health and safety orientation and AHA training for all site employees and lower tier subcontractors; held daily tailgate safety meetings and performed daily and weekly (with subcontractor superintendent) site inspections; and provided the overall maintenance of the site's Health and Safety recordkeeping system. Provided the management and maintenance of the site's CA Storm Water Pollution Prevention Plan. There were no OSHA recordable or lost time accidents for the project with over 25,000 employee hours worked.

Site Safety Health Manager and Quality Control Systems Manager, Sand Point, Seattle, Washington (7/09-8/09). Provided project management oversight and implementation/enforcement of the site's quality control and health and safety programs during the excavation and site restoration activities at the former Navy site. Provided three phases of quality control with preparatory and initial inspection meetings and daily follow up inspection reports for each definable feature of work. Provided

site management and QC of the excavation activities; collected confirmation soil samples including insitu sampling and analysis using field test kits. There were no OSHA recordable or lost time accidents during this project. Received the Client's Outstanding rating for this project.

Site Safety Health Manager and Quality Control Systems Manager, Mississippi Army Ammunition Plant, Stennis Space Center, Picayune, Mississippi (03/09-06/09). Provided project management oversight and implementation/enforcement of the site's quality control and health and safety programs during the decontamination and demolition of the facilities water treatment plant. Provided three phases of quality control with preparatory and initial inspection meetings, and daily follow up inspection reports for each definable feature of work and provided QC for: waste manifesting oversight and tracking of the transportation and disposal of building contaminants (asbestos, mercury switches, fluorescent light bulbs, PCB ballasts, low rad smoke detectors, and 200,000 gallons of contaminated water) and building materials recycled; backfill and restoration of the 5 acre site; and was the client and caretaker's point of contact for the site. Provided health and safety management of subcontractor providing the health and safety orientation and AHA training for all site employees; held daily tailgate safety meetings and performed daily and weekly (with subcontractor superintendent) site inspections; and provided the overall maintenance of the site's Health and Safety recordkeeping system. Provided the management and maintenance of the site's MS Storm Water Pollution Prevention Plan. There were no OSHA recordable or lost time accidents for the duration of the project. Received the Client's Outstanding rating for this project.

Health and Safety Quality Control Systems Manager and Health and Safety Manager, Ft. Hood Multipurpose Scout Qualification Range, Ft. Hood, Texas, \$7 million (09/07-12/08). Management and enforcement of project Quality Control and Health and Safety program for new and construction and restoration of a 500-acre firing range. Followed the USACE Quality Control three phases of construction inspections throughout the project using the QCS/RMS reporting system during the construction of military targets, a 3,000 sq ft prefabricated metal building, and construction of the range infrastructure including access roads, fiber optics, and electrical distribution systems, and site drainage. Provided site-specific H&S and Unexploded Ordnance (UXO) training, conducted noise surveys, and led the daily tailgate safety meetings.

Quality Control Assistant Manager and H&S Technician, TtECI, RMA Basin F Waste Pile (BFWP)/Enhanced Hazardous Waste Landfill (ELF), Commerce City, Colorado (5/06-9/07). Coordinated H&S activities and implemented HASP for \$35-million remediation contract to excavate and transport approximately 490,000 bcy of contaminated soil from Basin F to the LF. COCs include biota/HHE soil and debris. Interfaces on a daily basis with the H&S Supervisor and the client, conducting forklift and manlift operations and safety training. Ensures all operations comply with Activity Hazard Analyses, and is a certified AED user. Conducted environmental monitoring to determine levels of protection and extent of contamination. Maintained log books and files pertaining to H&S operations. Provided oversight of work under OSHA PPE Levels B, C, and D.

H&S Technician/QC Manager, USACE, Ft Leonard Wood, USACE, Missouri (1/06-2/06). Provided subcontract management, quality control, and all health and safety oversight during removal of stainless steel, double-walled piping in an area utilized as chemical training facility. Old utilities replaced with fiberglass piping and three fiberglass above-ground storage tanks. Interfaced with operators and management to ensure daily quality and safe operations.

Quality Officer, Omaha Lead Site, Omaha, Nebraska (11/04-12/05). Mr. Hayes was the lead Quality Control manager and client POC for this project and provided QC oversight and management of excavation and off-site disposal of lead-contaminated soils in an 8,840-acre residential area on the NPL. Managed the closeout of over 350 properties with Lead concentrations of 400 mg/kg or less in near-

surface soils per project requirements. Mr. Hayes as part of the field team devised, organized, coordinated, and implemented the excavation of contaminated soils and restoration of yards, driveways, fences, etc. in over 350 single home and multi-home dwellings in north and south Omaha, NE. In addition, Mr. Hayes provided QC oversight of third party confirmation soil testing and confirmation meeting project soil-lead levels. Mr. Hayes organized results with interpretation and submitting to client for final approval. All excavated areas were backfilled, graded, and landscaped. Yards were restored, and videotapes were recorded as verification. Mr. Hayes conducted final walk-through inspections with client representatives of restored residences. Throughout the process, Mr. Hayes was involved with storm water management and erosion control, and archaeological issues. Community relations were critical factor from start to finish each designated property remediation. **HST/QC Officer, AFCEE, Former Kelly AFB, San Antonio, Texas (2/04-11/04).** Provided H&S and QC oversight during the construction and installation of a groundwater extraction trench, excavation, and bioaugmentation of contaminated soils with edible oil emulsion, Site E-1 and Site D-10 Remedial Action.

Site Quality Representative, FWENC, RMA Section 36 Existing Sanitary Landfill Remediation Project, Commerce City, Colorado (2003). Prepared project plans, work plans, SSHPs, and quality control for remediation of 17 sites in Section 36. The sites varied from 255 bcy to more than 30,839 bcy. Soil contents consisted of HHE, B1, P1, trash and debris, and ACM contaminants requiring Level C PPE.

CQCS/SSHO, USACE Kansas City, Kansas AAP (2002-2003). Oversaw on-site H&S and QC of thermal treatment unit to treat 7,000 tons of TNT- and TDX-contaminated soil, including excavation, treatment, sampling and analysis, and restoration. Ensured work performed by 20 personnel and 7 subcontractors complies with air, soil, and disposal permits, work plans, SOPs, regulations, contract requirements, and USACE guidelines, including the three-phase QC principals. Had stop work authority.

QC Officer, USACE Kansas City, Nebraska Ordnance Plant, Nebraska (2000-2002). Provided QC oversight for the design, construction, and O&M of a 3,000-gallon groundwater treatment plant remediating RDX and TCE. Responsible QC management during installation of nine extraction wells, 10 miles of influent piping, and 6 miles of effluent piping. Interfaced with the previous contractor during project transition and provided QC oversight during the new plant startup. Ensured compliance with work plans, project plans and specifications, health and safety plans, and QAPPs. Reviewed and approved project submittals, and modifications to existing and new O&M manuals.

CQCSM, USACE Omaha District, Iowa AAP, Iowa (1998-2000). Developed and enforced contract-wide QC program in 100 percent compliance with site-specific QC programs for three TOs with no rework or nonconformances that included construction and O&M of a RCRA landfill, four water treatment facilities, a landfill leachate treatment facility, and an LTTD system. Conducted daily briefings and weekly inspections and supervised routine maintenance on treatment facilities. Supervised field sampling, field monitoring, and well abandonment during RCRA landfill cell, CAMU, and wetlands construction, capping, and water treatment activities. Ensured 14 field and lab personnel implemented proper sampling, analysis, and data management procedures on 627 groundwater, 4,720 soil, and 177 air samples, all accepted by USACE with no rework or nonconformances. Inspected and ensured proper operation of and prepared daily QC reports and submittals. Worked with EPA Region VII to refine soil sampling in order to determine the extent of excavation. There were no lost-time incidents in more than 160,000 work hours. Project received the 2000 USACE Omaha Commander Safety Award. Received letter of commendation from USACE Omaha District for an exceptional CQC system.

USACE Sacramento District, Point Arena AFB, California (1997). Landfill remediation and restoration. Scope included demolition of eight buildings contaminated with asbestos, and excavation of lead and POL-contaminated soil requiring level C PPE. As CQSM, Used three-phase QC principles to

develop, implement, and enforce QC oversight without rework and non-conformances. Developed, implemented, and enforced an asbestos and lead abatement work plan and CQC plan in compliance with all Federal, state, and local regulations. Assured quality of environmental sample collection, handling, shipping, and disposal of wastes. Performed asbestos air sampling and monitoring; QC checks and audits; daily reporting and documentation; and daily QC meetings.

USACE Tulsa District, Fort Sam Houston, Texas (1997). Interior building D&D involving asbestos. As CQCSM/Project Manager, Developed demolition methods that minimized airborne emissions of asbestos (Level C PPE), lead, PCB, and mercury, reducing levels of PPE. Hired and trained local personnel on QC issues.

USACE Tulsa District, La Tuna Federal Correctional Institution, Texas (1997). Asbestos and lead abatement (Level C PPE) and restoration of La Tuna Federal Correctional Institution. As CQCSM/Project Manager, managed the removal of asbestos and lead in compliance with all safety regulations. Completed the project on time and without QC violations or safety incidents despite security and schedule challenges. Received a letter of commendation from USACE for overcoming difficult circumstances.

USACE Sacramento District, Presidio of Monterey, California (1996). Asbestos abatement (Level C PPE), POL removal actions and landfill cap repair. As Project Manager, Developed asbestos abatement plans and generated daily reports. Received two letters of commendation from USACE Sacramento District.

NAVFAC WESTDIV, Hunter's Point Naval Shipyard, California (1995). Asbestos abatement (Level C PPE) and restoration. As Project Manager, Oversaw QC of daily environmental sampling for a 7-person crew, ensuring compliance with the CQCP. Developed asbestos abatement plans. Received letters of commendation from the US Navy and site office representative.

ATC Environmental (1991-1994). As Project QC Inspector/Industrial Hygienist/Site Safety and Health Supervisor, Conducted PCB surveys and abatement surveillance; implemented PPE/respiratory protection program and air monitoring programs; performed Phase I site assessments; bulk sampling for asbestos and lead, dust wipe sampling for lead; and performed QC inspections.

Harmon Electronics (1990-1991). As Health and Safety Coordinator, developed and implemented various health and safety compliance programs including safety program, hearing conservation, hazardous waste programs, and injury and illness program.

EDUCATION AND TRAINING

BS, Health Science, California State University, Northridge, 1989
USACE Construction Quality Management for Contractors (#784), 2016
Certified Safety Professional (CSP), 2012, Recertification 2017
40-hour HAZWOPER Training, 1995; Current 2018
8-hour HAZWOPER Supervisory Training, 1995
30-hour OSHA Construction Safety Class, 2007, 2014, 2019
Safety Trained Supervisor, 2006
CPR and First Aid, 2017
2-hour Asbestos Awareness Training, 2010
Certified Inspector Erosion and Sediment Control, 2011
Certified Inspector of Sediment and Erosion Control, 2011

Certified NIOSH (No. 582), 1991
Certified Radiation Training, 1991
Certified SciTech Lead Inspector, 1991
Certified SciTech Radiation Training, 1991
Certified Lead Project Designer, Management Planner, Inspector, Air Monitor, and Sampler, California
Department of Health Services, 1995

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

Certified Safety Professional (CSP) (#23669), 2015, 2017

EMPLOYMENT HISTORY

1994 – Present: ECC, Burlingame, California, S&H Officer/QC Officer
1991 – 1994: ATC Environmental Consulting, Los Angeles, California, QC Inspector/Site Superintendent
1990 – 1991: Harmon Electronics, Northridge, California, Health and Safety Coordinator

Certificate OF COMPLETION

IN RECOGNITION OF SUCCESSFUL COMPLETION IN:
CPR / AED / First-Aid
(Adult / Child / Infant / Choking)
AED / Injury & Universal Precautions

THIS CERTIFICATE IS PROUDLY PRESENTED TO:

Gregory Hayes

The above mentioned Student is now certified in the above mentioned course by demonstrating proficiency in the subject by passing the examination in accordance with the Terms & Conditions of National CPR Foundation - Valid for 2 years. Course administered in accordance with the **2020** ECC/ILCOR and AHA® guidelines. ID#: **397C1319**



COURSE PROVIDED BY:
NationalCPRFoundation

Completion: **February 5, 2023**

Instructor: **Paul J. Scruton**

Signature: *Paul Scruton*

AdvanceOnline Solutions Online Institute

Certificate of Completion

Greg Hayes

has met the online course completion requirements for

OSHA 30-Hour Construction Safety

This student has completed the formal instruction for the 30-Hour Construction Outreach Program. Topics covered in this program were Introduction to OSHA, Managing Safety and Health, Struck-by and Caught-In or Between Hazards, Personal Protective Equipment, Hearing Conservation, Respiratory Protection, Lead and Crystalline Silica, Asbestos, GHS Hazard Communication, Electrical Safety, Hand and Power Tools, Fall Protection, Ladder Safety, Excavations, Scaffolds, Crane Safety, Heavy Equipment, Forklift Safety, Materials Handling, Permit-Required Confined Spaces, Fire Safety, Welding and Cutting, Concrete and Masonry, Steel Erection, and Ergonomics.

As an OSHA Outreach Training Program trainer, I affirm that I have conducted this OSHA Outreach Training Program training class in accordance with OSHA Outreach Training Program requirements. I will document this class to my OSHA Authorizing Training Organization. Upon successful review of my documentation, I will provide each student their course completion card within 90 calendar days of the end of the class. — Rick Gleason

Instructor Rick Gleason

Course ID A0310

Certificate ID 328_1661608

Continuing Education Units 3.0

AdvanceOnline Solutions, Inc. offers 3.0
CEUs for this program.

Date 12/21/2019 12:56:00 PM

Time Online 40:51:20

AdvanceOnline Solutions, Inc.

1811 Bering Drive, Suite 430

Houston, Texas 77057

www.advanceonline.com

(713) 621-1100

AdvanceOnline
S O L U T I O N S

AdvanceOnline, Inc. is authorized to issue the ICSR CEU.



Experience Summary

Highly accomplished Certified Industrial Hygienist and Certified Safety Professional with over 29 years of on-site and project management expertise to provide oversight, review, reporting, training, and control of employee H&S processes on multiple construction/environmental sites.

Comprehensive knowledge of regulatory compliance requirements under OSHA, DOE, CERCLA, RCRA, USACE, EPA, and other federal/state regulatory programs.

Hands-on experience in compliance monitoring, development and implementation of policies and procedures, accident investigation, and worker's compensation issues.

Proven record of retaining minute detail with excellent recall regarding safety regulations and contractual language to make on-the-spot independent decisions.

Well respected with reputation for using excellent interpersonal communication skills to collaborate with staff, all levels of management, and clients.

Consistently commended for outstanding leadership skills, producing quality work product, developing proactive initiatives, and commitment to achieving optimum project safety expectations to ensure client satisfaction while adhering to corporate policy and procedures.

Education

BS (Bachelor of Science), Environmental Health, Industrial Hygiene Concentration, Old Dominion University, Norfolk, VA

Registrations/Certifications

Certified Industrial Hygienist

Certified Safety Professional

Training

40-Hour OSHA Hazardous Waste Health and Safety Training – 1989

40-Hour EM 385 1-1 Awareness Course- 2018

30-Hour OSHA Construction Safety Course- 2004

Shipyard Competent Person- 2019

Experience

Corporate Safety Director, May 2021-Present

ECC, Virginia Beach, VA

Responsible for overall management and implementation of ECC's safety program. Manage site safety and health professionals on projects and ensure safety staff assignments to meet project and client needs. Write, review, and approve site-specific health and safety plans. Conduct program reviews and audits for compliance and continual improvement.

Program Health and Safety Manager, April 2020-May 2021

ECC Camp Lejeune Operations, Jacksonville, NC

Responsible for overall management of the safety and health programs for ECC, as part of the NAVFAC Global Contingency Construction Hurricane Florence Recovery, and add-on Work. Task orders under this program involved debris removal, building renovation, lead and mold remediation, water treatment for PFOS contamination, installation of roofing, upgrades to waste water treatment systems, repairs of training roads and bridges, marina demolition and repairs, upgrades to electrical

systems, runway repairs, repairs to landing areas for military aircraft, and installation of temporary trailers.

- Monitor overall safety and health compliance, assistance, and oversight of more than 30 active task orders conducted concurrently on base.
- Assist in preparation and review of project work plans in relation to site specific safety program documents.
- Ensure compliance with lead, asbestos, and silica regulations
- Oversee industrial hygiene issues and ensure appropriate protective measures were implemented.
- Assist in implementation of safety processes on active project sites.
- Provided technical guidance to project and program employees as well as clients.
- Revise and develop programs and procedures

EHS Manager, September 2018-April 2020
APTIM, Norfolk, VA

Responsible for overall management of safety programs for APTIM's Government operations. Operations involved environmental remediation, fuels, UXO range clearance, and construction, CONUS, OCONUS, International and US Territories.

- Monitor overall safety compliance, assistance, and oversight of multiple task orders for Federal as well as commercial client project sites.
- Assist in preparation and review of project work plans in relation to site specific safety program documents.
- Assist in implementation of safety processes and manage safety staffing on active project sites.
- Provided technical guidance to project and program employees as well as clients.
- Manage injuries and illnesses, and related worker's compensation claims.
- Assist in safety council, award programs, and employee involvement initiatives.
- Conduct periodic reviews and audits of project sites to determine compliance with applicable regulations, standards, and internal procedures.

Projects included:

Fuel Storage Tank Upgrades and Repairs, AFCEC, 9/2018-4/2020:

- Okinawa, Japan
- Wake Island
- Diego Garcia

NAVSEA POL Hardening Project, NAVSEA, Naval Base Guam, 8/2019-4/2020

NAVFAC RAC, Miscellaneous UXO and HRTW Project Oversight, 9/2018-4/2020

- NAS North Island removal action
- Camp Pendleton removal action
- Camp Pendleton Range Clearance
- Town of Coupeville Drinking Water System Upgrades due to PFOS/PFOA
- Naval Weapons Industrial Reserve Plant, Bethpage, NY Remedial Action
- Naval Weapons Industrial Reserve UXO Clearance Activities Calverton, NY

Director, EHS June 2018-September 2018

Tetra Tech EC, Inc., Virginia Beach, VA

Responsible for overall management of environmental health and safety programs and employees for Tetra Tech EC operations, CONUS, OCONUS, and International. Projects. Projects consisted of environmental remediation, coal-ash management, UXO clearance, and mine closures. Clients included commercial as well as DOD, EPA, USACE, and State Department.

- Serves as program Certified Industrial Hygienist for the Atlantic Division Remedial Activities Contract, Naval Facilities Engineering Command.
- Manage overseas operations for the State Department UXO clearing operations in the Middle East
- Provides technical support for programs and projects, including proposal review and support.
- Manages site safety and health professionals on projects and ensures safety staff assignments to meet project and client needs.
- Injury case management and worker's compensation claim management.
- Writes or reviews and approves site-specific health and safety plans.
- Conduct program reviews and audits for compliance and continual improvement.

EHS Manager of Eastern Operations, September 2015-June 2018

Tetra Tech EC, Inc., Virginia Beach, Virginia

Responsible for assisting the Tetra Tech EC Director in overall management of safety programs for Tetra Tech EC's operations.

- Monitor overall safety compliance, assistance, and oversight of multiple task orders for Federal as well as commercial client project sites:
- Assist in preparation and review of project work plans in relation to site specific safety program documents.
- Assist in implementation of safety processes and manage safety staffing on active project sites.
- Provided technical guidance to project and program employees as well as clients.
- Manage injuries and illnesses, and related worker's compensation claims.
- Facilitated implementation of LANT RAC program safety council, award programs, and employee involvement initiatives.
- Conduct periodic reviews and audits of project sites to determine compliance with applicable regulations, standards, and internal procedures.
- Program CIH for LANT RAC VI Navy contract.

Projects included:

NAVFAC RAC 9/2015-9/2018

- Naval Station Newport Dredging Operations remedial action
- MCAS Yuma Range Clearance Activities
- Yorktown Naval Weapons Station Remedial action Site 24

EPA, USACE

- Fox River Superfund Site, Green Bay, WI- removal operations/dredging operations
- Gilt Edge Mine Closure, South Dakota

Private Sector Client

- Middle River Maryland Dredging project to remove contamination from the Middle River
- Kentucky Utilities Ash Pond Closures

ES&H Manager, August 2012 – September 2015

CB&I AREVA MOX Project, DOE, CB&I (formerly Shaw) Project Services Group, Aiken, SC

Manage all safety aspects of the project, including sub-contractors. The project has exceeded 21 million man-hours without a lost work day case, and achieved VPP Status.

- Responsible for management of the on-site medical clinic, fitness center, production facility safety staff, and all field safety engineers.
- Interface between high level construction management, client, and field construction employees, to ensure clear communication of expectations to continue to promote a positive safety environment that has yielded exemplary employee safety performance.
- Technical resource for all project staff, as well as client.

August 2002 – August 2012, SHAW E&I, Norfolk, VA

Ten years of progressive experience and achievement as safety project management/ site safety coordinator

Program Safety Manager, May 2008 – August 2011

IHNC, USACE, New Orleans,

Accountable for establishment and initial/continued implementation of project safety programs for this high profile \$1.1B project involving design and construction of the New Orleans Hurricane and Storm Damage Risk Reduction System.

Successfully managed the safety program for the largest civil works design-build project ever undertaken by the USACE. The project, during this timeframe, concluded with “no lost work days” for Shaw. Staffed project, developed project safety initiatives, wrote and implemented the Accident Prevention and Hurricane Preparedness Plans, coordinated training, conducted subcontractor reviews, and acted as overall technical consultant regarding project safety issues, and compliance monitoring of the safety process. This project included heavy marine construction involving hydraulic dredging, mechanical dredging, cutterhead dredging, pile driving, crane operations/heavy lifts, critical lifts, concrete placement, construction of coffer cells, dive operations, work from barges, work in extreme environments.

Program Safety Manager, November 2007 – August 2012

Global Contingency and Construction Contract (GCCC), NAVFAC (Naval Facilities) Worldwide

Served as Program Health and Safety Manager for this \$335M US Navy contract. Directed safety programs for all construction projects under the GCCC contract. Implemented safety processes, managed staffing, developed H&S and Accident Prevention Plans, managed worker's compensation claims, and provided technical oversight to staff and management on all projects. Developed documents and programs to ensure training, programs, and procedures were translated into local languages and worked with third country nationals to establish safety cultures where previously non-existent. Monitored and ensured the implementation of corporate policies and procedures, conducted incident investigations, and maintained proactive safety programs. Ensured compliance with applicable laws/regulations, and provided safety support/consultation to Shaw management, as well as client companies and governmental entities.

Program Safety Manager, May 2008 – 2012

LANTDIV RAC V Program, NAVFAC Atlantic Division, Norfolk, VA

Directed overall program safety on this \$150M Navy contract, including safety program implementation and oversight of multiple task orders under the contract.

- Instrumental in team accomplishing 4,000 days with a record of “no lost work days.”
- Implemented safety processes, managed staffing, developed health and safety, and accident prevention plans.
- Provided technical guidance to project and program employees as well as clients.

- Managed injuries and illnesses, and related worker's compensation claims.
- Facilitated program safety council, award programs, and employee involvement initiatives.

Program Safety Manager, December 2002 – August 2012

Served as Program Safety Manager leading a staff of field safety professionals in the development and implementation of safe work practices on multiple individual task orders. Also, functioned as Site Safety Coordinator for several individual projects at multiple locations conducted under the LANTDIV RAC IV program.

These projects included UXO demilling activities, active range clearance activities for UXO, "Clean" site closures, installation of treatment systems, storage tank removals, bio-remediation, landfill excavation/repairs/capping, soils excavation and removal of hazardous materials.

- 2000 Day President's Award for no lost work days on one project.
- Target Zero achieved for 2 Project Sites.
- RAC Program achieved Zero Lost Work Days, Recordable Incidents or Chargeable Vehicle Incidents within Fiscal Year 2008.
- Successfully adapted to EHS organizational changes, and positioned to advance within group.

Project Experience:

Program Safety Manager, Repair and Construction Projects, , Camp Lemonnier Djibouti ACC, LLC, Camp Lemonnier, \$20,000,000.00, 11/2007 – 12/2008

This project consists of the construction of several buildings, upgrades to the electrical distribution system, upgrades to the water system, and repairs to the HESCO security wall.

Site Safety Coordinator, UXO 32 Scrap Yard, 831866, U.S. Navy, Indian Head, Maryland, \$921,000.00, 07/2005-12/2005

This project includes removal of all stored UXO located at the Scrap Yard location at the Indian Head Naval Base. Shaw has performed and will perform additional demilling of all inert rounds to be conducted in accordance with U.S. Navy standards for UXO scrap and will include the set up of a remote water cutting operation that will allow all MPPEH's to be opened remotely and have the contents sampled to determine if MPPEH's contain explosives.

Site Safety Coordinator/Program Safety Manager, Building 383, Bunker 154Y & Bunker 163 RCRA Closures RAC III, TO 0083, U.S. Navy, LANTDIV RAC, Portsmouth, Virginia, 02/2004 - 07/2006

This project requires completion of the necessary remedial actions as defined by the approved closure plans for each site in an effort to demonstrate that these specified remedial actions were sufficient to achieve a "Clean" Closure of the site as agreed upon by the U.S. Navy and approved by the Virginia Department of Environmental Quality. Specifically, remedial actions for this site include demolition and removal of a 30,000 square foot (sf) concrete foundation slab and two bunkers totaling approximately 3,000 tons of concrete, removal and disposal of approximately 6,000 tons of soil, replacement of 250 lf of storm sewer pipe, confirmation soil sampling and analysis, and restoration activities.

Site Safety Coordinator, FSSI-14 Camp Peary Site 60, Camp Pearl, Williamsburg, Virginia, 05/2005 - 12/2005

The removal action involved the removal of soil and debris inside two concrete pools. In **addition**, the lead-based coating applied to the interior surface of the pools was scarified to remove the lead. Lead containing waste material was stabilized on site, prior to shipment to the disposal facility.

Site Safety Coordinator, WPNSTA Yorktown, Site Safety Coordinator/Program Safety Manager, Yorktown, Virginia, 01/2005 - 12/2005

This project consisted of the demolition of a former Storage Magazine and the subsequent excavation and disposal of soil and debris in conjunction with a RCRA facility closure.

Site Safety Coordinator, F-18 Aircraft Crash Site Remediation RAC 4 Task Order 0027, U.S. Navy LANTDIV RAC, Morrisville, North Carolina, 04/2004 - 05/2005

This politically-charged cost-reimbursable project involves the successful remediation and restoration of the crash site impacted areas of the RDU Airport to precrash conditions as directed by the Navy and approved by the RDU Airport Authority and North Carolina Department of Environmental and Natural Resources. Specific activities included maintaining absorbent boom along the fuel impacted drainage basin, cleaning approximately 900 linear feet (lf) of affected storm sewer, removal of approximately 1,000 tons of fuel-impacted soil at the crash site and in an open stormwater drainage channel, cleaning of charred/stained surfaces on the roadways, confirmation and investigative sampling activities, and backfilling and seeding of the excavated and disturbed areas.

Site Safety Coordinator, Phases IIa, IIb and IIC Expansion, Navy Standard/Special Fuel Oil, U.S. Navy, Yorktown, Virginia, 12/2003 - 02/2005

This project consisted of the installation of approximately 5,300 linear feet of interceptor trench using a one-pass trenching method. The trenches were installed to a depth of 35 feet. In addition to the trenches, 46 recovery wells and approximately 9,000 linear feet of conveyance piping was also installed. Construction of upgrades to fuel farm treatment facility.

Site Safety Coordinator, Hampton Roads O&M RAC 4 TO 0021, U.S. Navy LANTDIV RAC, Norfolk, Virginia, 02/2004 - 01/2005

This cost-reimbursable project involved the O&M of three groundwater remediation systems. These systems include one pump and treat and two air sparging / soil vapor extraction (SVE) systems. The systems all treat groundwater contaminated with volatile organic compounds (VOCs) such as vinyl chloride, tri-chloroethylene, and di-chloroethylene. Air stripping, metals precipitation via pH adjustment and an inclined plate clarifier, and mechanical filtration via sand and granular activated carbon vessels are some of the treatment technologies used.

Site Safety Coordinator, Site 6 Bioremediation of Explosive-Contaminated Soils, LANTDIV NAVFAC ENCOM, Yorktown, Virginia, 01/2003 - 01/2005

This project consisted of the excavation of 2,000 tons of explosive- and VOCs-contaminated soil from a tidally-influenced marsh and transporting the material to a biocell for bioremediation.

Site Safety Coordinator, RCRA Closure Building 402, 840174, LANTDIV NAVFAC ENCOM, Yorktown, Virginia, 07/2004 - 12/2004

This project consisted of the demolition of a former Storage Magazine and the subsequent excavation and disposal of soil and debris in conjunction with a RCRA facility closure.

Site Safety Coordinator, Site 4 Removal Action, WPNSTA Yorktown LANTDIV NAVFAC ENCOM, Yorktown, VA, 01/2003 - 10/2004

This project consisted of the excavation and transportation of approximately 85,000 tons of contaminated soil and debris from a former burn area. Originally, the scope was to remove 2,000 tons of contaminated soil; however, it was discovered that the site was a former dumping area of municipal

waste, debris, and munitions of concern (MEC). Following the discovery of MEC, unexploded ordnance (UXO) support was mobilized to the site to observe the excavation activities.

Due to the large volume of waste excavated from the site, Shaw convinced the Navy to regrade the site instead of transporting 40,000 cubic yards (cy) of fill to the site to restore it to its original condition. This decision saved the Navy approximately \$100,000.

Site Safety Coordinator, Colonie FUSRAP, U.S. Army Corps of Engineers, Colonie, New York, 03/2004 - 05/2004

USACE's Colonie FUSRAP Site, a \$71,000,000 environmental remediation in New York. The work is ongoing and is being continued under Delivery Order 02 of the KC PRAC contract vehicle. Previously the work was conducted under Task Orders 22 (\$350,000), 24 (\$20,801,000) & 40 (\$11,611,000) of the BTERC. The site has excavated over 137,000 cu.yds. of mixed RCRA and Radiological wastes, performed on-site stabilization & treatment of over 112,000 tons of RCRA D-008 soils, packaged and shipped over 180,000 tons of waste materials, performed on-site wastewater treatment of 32,000,000 gallons of contaminated surface/groundwater.

Site Safety Coordinator, NYSSYI/AWI Site 9, U.S. Navy LANTDIV RAC, Portsmouth, Virginia, 12/2002 - 08/2003

Key elements of this project included in-situ stabilization and removal of >21,000 cy of calcium hydroxide that extended to depths of 15 feet below grade directly adjacent to the Elizabeth River, management of UXO uncovered during excavation, installation and operation of a water treatment system that treated over five million gallons of excavation water, installation of a nearly two-acre tidal wetlands, and the unique fact that the project was co-funded by Atlantic Wood Industries (AWI) and the U.S. Navy.

Field Health and Safety Technician, Remedial Investigation, U.S. Army Corps of Engineers, Ft. McClellan, Anniston, Alabama, 10/2002 - 12/2002

Project involved the installation of groundwater monitoring wells for remedial investigation for the removal of 3X scrap at previous chemical training area. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE Compliance. Project work was conducted in areas know to contain chemical weapons and MEC.

Site Safety Coordinator, Mitigation of Contamination and the Reconstruction of a Wetlands, Naval Facilities Engineering Command (LANTDIV) ATLANTIC Division, Dahlgren, Virginia, 08/2002 - 12/2002

The project consisted of the mitigation of contamination and the reconstruction of a wetlands area.

Site Safety Coordinator, St. Juliens Creek Annex site 3, 6, & 7, U.S. Navy LANTDIV RAC, Chesapeake, Virginia, 08/2002 - 09/2002

This project involved the removal of approximately 4,500 tons of contaminated soil utilizing UXO avoidance methods and XRF technology to guide the excavation.

Environmental Health and Safety Manager, October 2000 – April 2002
Flextronics Enclosures, Kingston, PA

Responsible for the development, implementation, and monitoring of Flextronics Enclosures, Inc. Environmental Health and Safety program.

- Conducted initial audits, assessments, and industrial hygiene sampling, to determine environmental, safety, and industrial hygiene compliance issues.
- Developed plans and procedures necessary to attain compliance with water permitting, waste disposal, safety and industrial hygiene issues.
- Developed programs to decrease employee injuries as well as reduce incident rates and worker's compensation costs.
- Worked with local occupational health clinic to better manage accidents and injuries, to keep employees at work, and ensure best care possible.
- Responsible for maintaining OSHA 200 logs.
- Conducted and facilitated training sessions for managers and technicians to ensure understand and compliance with new company safety programs.
- Monitored effectiveness of new EHS Program and continually improved upon programs implemented.
- Developed and implemented an Environmental Management System to be compliant with ISO-14001.

Environmental Scientist, January 1996 – April 1997
Maxim Technologies (formerly Huntingdon Chen-Northern), Denver, CO

Assigned to USEPA Superfund Technical Assistance and Response Team, sub-contracted to the primary USEPA contractor.

- Conducted hazardous waste and emergency response operations, including delineation of contamination, site control, and contamination monitoring and reporting.
- Provided on-site technical support to EPA and oversight of contractors for EPA.
- Provided assistance to EPA regarding sampling, management, and disposal of hazardous and mixed wastes.
- Conducted preliminary site investigations to determine presence and extent of contamination on sites.
- Assisted in development of work plans and provided assistance to EPA for subsequent remediation of contaminated sites and abandoned industrial facilities.
- Conducted hazardous materials training as required by OSHA for hazardous waste site work and emergency response, as well as the hazard communication standard.
- Assisted EPA in conducting public information meetings pertaining to remedial sites.

Health and Safety Manager, August 1994 – January 1996
Maxim Technologies (formerly Huntingdon Chen-Northern), Denver, CO

Responsible for the overall management of Maxim's regional health and safety program.

- Developed and implemented corporate health and safety procedures throughout the Northwest Region.
- Managed accidents and injuries as well as required documentation on OSHA 200 logs.

- Responsible for compliance, documentation, and disposal of hazardous materials generated by the regional offices.
- Assisted environmental groups in conducting Phase I site assessments.
- Conducted training for Hazardous Waste Site Work, Hazard Communication, Asbestos Awareness, Instrumentation, and Air Monitoring.
- Conducted accident investigations and management of workers' compensation claims.
- Developed site specific health and safety plans for hazardous waste site work.
- Provided technical support in the areas of industrial hygiene and health and safety.

Site Safety Supervisor, October 1992 – June 1994

OHM Corporation, Findlay, OH

Responsible for the implementation, and management of site specific environmental, industrial hygiene, health, and safety programs, in accordance with site specific health and safety plans.

- Conducted initial site hazard assessments.
- Assisted in completing and maintaining documentation related to hazardous waste storage and disposal.
- Monitored compliance of site operations with respect to OSHA, EPA, and state regulations, such as, RCRA, TSCA, AHERA, HAZWOPER, and HAZCOM.
- Implemented appropriate means to control hazardous materials exposure.
- Monitored the effectiveness of on-site industrial hygiene and safety programs.
- Initiated safety awareness programs.
- Conducted training as required by 29 CFR 1910.120 and the Hazard Communication Standard.
- Liaison between client representatives and OHM in regard to environmental, industrial hygiene, and health and safety issues.

Division Safety Coordinator, October 1989 – October 1992

MAECORP Inc., Columbus, OH

Responsible for the implementation and compliance monitoring of company safety policies in addition to Federal and State OSHA and EPA regulations, on hazardous waste project sites in USEPA Region V.

- Conducted site safety audits and prepared appropriate reports.
- Conducted air monitoring for personal exposures in addition to environmental air sampling.
- Conducted annual refresher training for hazardous waste site operation.
- Developed site specific health and safety plans in accordance with the requirements 29 CFR 1910.120.
- Conducted building inspections for asbestos.
- Maintained appropriate documentation in regard to medical monitoring requirements, training certificates, and hazard communication.
- Conducted accident investigations.
- Managed work related injuries.

References available upon request

The Board for Global EHS Credentialing (BGC)

through its vested authority, hereby confirms that

Kym Y. Edelman

has met all requirements of education, experience, and examination, and on-going maintenance set forth through the BGC's American Board of Industrial Hygiene® (ABIH®) credentialing division for re-certification in the Comprehensive Practice of Industrial Hygiene and is thereby conferred the credential of

Certified Industrial Hygienist® (CIH®)

The aforementioned individual is given all rights, privileges, and responsibilities as both a diplomate of the BGC and holder of the CIH credential, provided that the credential is not suspended or revoked, and it is renewed annually. Moreover, the holder must meet all recertification requirements, including the obligation to practice ethically as prescribed by the BGC.



Credential Number: 11090 CP

Award Date: October 26, 2016

Expiration Date: June 1, 2027

A handwritten signature in black ink, appearing to read "Alan Leibowitz", written over a horizontal line.

Alan Leibowitz, CIH, CSP, FAIHA
Chair of the Board of Directors



A handwritten signature in black ink, appearing to read "Ulric K. Chung", written over a horizontal line.

Ulric K. Chung, MCS, PhD
Chief Executive Officer and Secretary

Kym Edelman

From: kyme6604 <kyme6604@aol.com>
Sent: Monday, January 24, 2022 2:29 PM
To: Kym Edelman
Subject: FW: Recertification Requirements Met

CAUTION: This email originated from outside of the organization.

Kym

----- Original message -----

From: bcsp@bcsp.org
Date: 1/19/22 4:00 PM (GMT-05:00)
To: kyme6604@aol.com
Subject: Recertification Requirements Met

BCSP[®] | **Board of Certified Safety Professionals**
8645 Guion Road, Indianapolis, IN 46268 USA
P: +1 317-593-4800 • F: +1 317-593-4400
bcsp@bcsp.org • bcsp.org



RELAX. YOU DID IT!
RECERTIFICATION REQUIREMENTS MET!



Dear Ms. Edelman,

Congratulations! Your recertification activities for your CSP certification have met recertification requirements.

You may log in to **My Profile** at [BCSP.ORG](https://bcsp.org) to view your updated account information and recertification cycle dates.

Please retain this message as proof of your recertification compliance for your CSP certification.

If you have questions regarding this notice, please contact Certification Services at bcsp@bcsp.org.

Sincerely,

Certification Services

DISCLAIMER:

This e-mail is only intended for the person(s) to whom it is addressed and may contain confidential information. Unless stated to the contrary, any opinions or comments are personal to the writer and do not represent the official view of the company. If you have received this e-mail in error, please notify us immediately by reply e-mail and then delete this message from your system. Please do not copy it or use it for any purposes, or disclose its contents to any other person. Thank you for your cooperation.

Recert_Met_CSP | V.2019.07.29

Certificate Of Completion



KYM EDELMAN

Has diligently and with merit completed the
40-Hour EM 385-1-1 on 7/6/2018

A handwritten signature in black ink, appearing to read "Jeff Pairan".

Director: Jeff Pairan



HST

CERTIFICATE OF TRAINING

THIS CERTIFIES THAT

Kym Mohrman

has successfully completed 40 hours of instruction in

WASTE SITE WORKER PROTECTION

Prepared and conducted by
Hygiene, Safety and Training Inc.
to comply with OSHA 1910.120(e)(2)

Jack M. Peterson
Jack M. Peterson
CSP, CIH

November 10, 1989
Date of Completion

PROFESSIONAL SUMMARY

Quality driven dependable and detail-oriented Certified Safety Professional with over 15 years of military and civilian workplace safety and improvements, with an active Secret Clearance. Comprehensive knowledge of regulatory compliance requirements under OSHA, DOE, DOD, USACE, EPA and other federal/ state regulatory programs. Hands on experience in compliance monitoring, development and implementation of policies and procedures, accident investigation, and workers compensation issues. Proven record of retaining minute detail with excellent recall of safety regulations and contractual language to make on the spot independent decisions. Well respected with reputation for using excellent interpersonal communication skills to collaborate with staff, at all levels of management, and clients. Consistently commended for outstanding leadership skills, producing quality work product, developing proactive incentives, and commitment to achieving optimum project safety expectations to ensure client satisfaction while adhering to corporate policy and procedures.

EDUCATION

MS (Master of Science) Occupational Safety and Health, Columbia Southern University, Orange Beach, Alabama
BS (Bachelor of Science) Aviation Maintenance Management, Embry Riddle Aeronautical University, Daytona Beach, FL

REGISTRATIONS/CERTIFICATION

Certified Safety Professional, Board of Certified Safety Professionals, CSP-39911
Certified Instructional Trainer, Board of Certified Safety Professionals, CIT-14186
Construction Quality Management for Contractors-USACE #784
Manager Environmental Safety and Health (C-MESH)- NC State University
Security Clearance- SECRET-Active
American Society of Safety Professionals
CCO Rigger Level 1
CCO Signallerperson
Lean Six Sigma- Yellow Belt
American Red Cross- CPR-First-AED Instructor / Cert ID: 002LLGH
Site Safety and Health Officer- USACE

TRAINING

40-Hour Hazardous Waste Health and Safety Training (HAZWOPER)
40-Hour EM 385 1-1 Awareness Course
OSHA-510 Standards for Construction
24-Hour Fall Protection
30-Hour OSHA Construction Safety Course
Safety and Health Management Systems for Small Business- NC State University

EXPERIENCE

Program Health and Safety Manager, May 2020-Present
ECC, Jacksonville, NC

Responsible for overall management of the Safety program for the Camp Lejeune/MCAS New River projects for ECC.

- Ensured the implementation of Accident Prevention Plans (APP)

EHS Manager

Email:Nickrood22@gmail.com

- Oversaw the completion of Activity Hazard Analysis (AHA) preparation and acceptance
- Authored health and safety related documentation (reports, logs, records, and site-specific risk mitigation plans), completing required information for daily reports and client communications in a timely and accurate manner
- Provide health and safety management/oversite for subcontractors for multiple projects that encompass, multiple dredging/ barge operations within the intercoastal waterway, turbidity curtain installation, extensive deep excavations >20', authoring lift plans and supervising lifting, rigging, and crane operations, bridge construction, HDD drilling, confined space operations, vertical construction, and interior restoration
- Provided mentoring, direction, and subject matter expertise to Health & Safety Supervisors and/or junior level staff
- Provide oversight to subcontractors, clients, and project team members to ensure that project activities are completed according to applicable APP(s)
- Prepared ESQ reviews on sub-contractors to evaluate EMR, DART, and DAFW rates to ensure contract compliance
- Directed responsibility for contract compliance in government construction and environmental projects on a \$500,000,000 multi scope project (civil, marine, interior, roofing) for Naval Facilities Engineering Command and United States Army Corps of Engineers.
- Alternate SSHO for Electrical Distribution Phase II. Duties included installation of generators, transfer switch installations and replacements. Also included was the transfer of overhead electrical to underground distribution.
- Managed all aspects of interior renovations of multiple buildings to include the installation of temporary and permanent power.

Health and Safety Supervisor-April 2019-May 2020

ECC, Jacksonville, NC

Responsible for assisting Program Health and Safety Manager in overall safety programs for ECC's Camp Lejeune, MCAS New River, and MCAS Cherry Point safety programs.

- Successful leadership of subcontractors and project teams in support of health and safety endeavors
- Directed responsibility for contract compliance in government construction and environmental projects on a \$500,000,000 multi scope project (civil, marine, interior, roofing) for Naval Facilities Engineering Command and United States Army Corps of Engineers.
- Hands on experience in industrial hygiene monitoring and use of hazardous work permits.
- Conducted regular inspections and audits to assess health and safety plan adherence as well as identify potential loss and risk.
- Provide knowledge, guidance, and training on US Army Corps of Engineers EM 385 1-1
- Represented the Company in a positive and professional manner in client and regulatory agency interactions, serving as the primary point of contact for site health & safety
- Conducted related investigations thoroughly, completing associated documentation Accurately

Health and Safety Technician/Trainer-November 2015-April 2019

Southeast Connections, Wilmington, NC

Responsible for safety and regulatory compliance for 10 natural gas installation crews working under the Duke and Piedmont Natural Gas umbrella throughout Eastern NC.

- Developed and administered programs that educated employees on, and ensured compliance with, all regulations issued by the Occupational Safety and Health Administration (OSHA) and other governmental agencies.
- Conducted accident and incident investigations, determined root cause, and made

NICHOLAS ROOD, CSP,CIT

© 910-915-9679

EHS Manager

Email:Nickrood22@gmail.com

recommendations for corrective action

- Prepared reports detailing health and safety issues by collecting, analyzing, and summarizing information and trends.
- Performed job site audits to evaluate the effectiveness of Health and Safety systems/procedures and identify and implement improvements.
- Provided company training on all aspects of safety and industry specific operator qualifications.

**Quality Assurance Chief, Department of Operational Safety and Standardization,
June 2007-October 2013**

United States Marine Corps, MCAS New River, NC

Responsible for implementing and supervising aviation and ground mishap prevention programs.

- Provide training on all aspects of aviation safety as well as ground safety.
- Conducted on site accident investigations (aviation and ground) and developed plans and guidance for corrective action
- Conducted human factors boards as directed by the commanding officer
- Ensured pre-mishap plan drills were conducted annually, and the pre-mishap plan was updated prior to any change of operating base
- Monitored and reported recommendations concerning staff proposals affecting flight operations, training, and aircraft maintenance that pertained to safety to the DSS
- Advised the commander and DSS on all matters pertaining to the organization's aviation/ ground safety program
- Performed audits on all aviation related programs to ensure proper compliance with safety and Marine Corps standards where upheld.
- Trained new safety/quality assurance representatives as the Subject Matter Expert

Aviation Maintenance Technical Trainer/Master Training Specialist- June 2004-September 2007

United States Marine Corps, Center for Naval Aviation Technical Training, Camp Pendleton, Ca

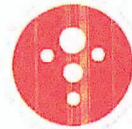
Responsible for the training of entry-level maintainers by means of platform instruction and hands on training.

- Provided platform instruction and hands on maintenance training to entry level mechanics to qualify them on the UH-IN/AH-IW, and UH-IY/AH-IZ
- Developed and reviewed the transition from two-bladed H-1 platform to Four-bladed H-1 platform as the subject matter expert for powertrains, rotors, and related courses
- Designated as a Master Training Specialist. The highest instructor rating within the United States Navy.
- Successfully trained 5 Instructor Evaluators and 3 Master Training Specialists
- Graduated over 200 students to become basically qualified maintainers

NICHOLAS ROOD, CSP,CIT
EHS Manager

© 910-915-9679
Email:Nickrood22@gmail.com

Certificate of Completion



360training

This Certifies That

Nicholas Rood

is awarded this certificate for

OSHA 30 Hour Outreach Training Program - Construction

360training.com, Inc. is authorized by IACET to offer 3.0 CEUs for this program

Credit Hours: 30.00

Completion Date: 07/31/2017

Matthew Luman

Matthew Luman, Trainer C 0105487 and G 000079198



"As an OSHA authorized trainer, I verify that I have conducted this OSHA outreach training class in accordance with OSHA Outreach Training Program requirements. I will document this class to my authorizing OSHA training organization. Upon successful review of my documentation, I will provide each student their completion card within 90 days of the end of the class."

360training.com, Inc. is accredited by the International Association for Continuing Education and Training (IACET) and is authorized to issue the IACET CEU.

360training.com ♦ 13801 Burnet Rd., Suite 100 ♦ Austin, TX 78727 ♦ 877.881.2235 ♦ www.360training.com



360training.com®

Certificate of Completion

This is to certify that

Nick Rood

has completed the course

40-hour EM 385-1-1 USACE Safety & Health

Completion date: 01/04/2020

Course duration: 40.0

Certificate # 000016694035


Samantha Montalbano
Chief Operating Officer



Standard CPR/AED & First Aid (adult, child, infant)

STUDENT Nicholas Rood

This card certifies that the individual has successfully completed the requirements in accordance with the National Health & Safety Association curriculum.

Course administered by the National Health & Safety Association following the 2020 ECC/ILCOR and American Heart Association guidelines.

CERTIFIED ON Apr 4, 2023 **VALID 2 YEARS**

ID 479409-41568900BC

For course details and recertification, visit cpr.io

You'll find your card above. It includes the date of certification, a unique id, and the title of the course you took with National Health & Safety Association.

Print your card, cut it out, and then fold it down the center. You can then tape or glue it together. Carry the card in your wallet or purse, to have available if you need to reference it.

We have also sent an email with a link to your wallet card. Make sure to save the email so you can print additional copies of your card at any time.

Congratulations,

National Health & Safety Association

Jeffrey Knight, RRPT

Health Physics Supervisor

Education/Qualifications:

A.A.S., Environmental Health/Health Physics, Roane State C.C of Tennessee, 1999

A.A.S., Electrical Engineering, Pellissippi State of Tennessee, 1988

National Registry of Radiation Protection Technologists (NRRPT)

Inactive "Q" Clearance 2006

Relevant Experience:

Mr. Knight is a Registered Radiation Protection Technologist (RRPT) with close to 25 years of experience implementing radiation protection programs. His broad range of experience includes providing radiation protection program support at US. DOE and NRC licensed facilities. He has served as Radiation Safety Officer (RSO) and/or Radiological Engineer for a number of SEC projects including West Valley Demonstration Project (DOE), DR&D project at Argonne National Lab (DOE), Waste Removal and MARSSIM surveys at Advanced Medical System (NRC), Cleveland, OH, and the Providencia Site in Burbank, CA (NRC). Mr. Knight is an expert in the application of MARSSIM-based scoping, characterization, and final status surveys (FSSs) of buildings and open land areas; data reduction, evaluation, and interpretation; gamma mapping using GIS software; and preparation of final reports. He also has extensive experience in the area of radio-analytical operations involving gamma spectroscopy, ISOCS, and low background gas proportional counting; liquid scintillation; as well as calibration and repair of portable field radiation detection equipment.

RELEVANT EXPERIENCE HIGHLIGHTS

- 25 years' experience implementing radiation protection programs
- Extensive experience in radio-analytical operations involving gamma spectroscopy and ISOCS
- Expert in application of MARSSIM-based scoping, characterization, and final status surveys (FSSs)
- Extensive experience in radiation detection and protection, instrument repair, sampling, area/site surveys, data analysis and documentation, and compliance

Employment History:

Safety and Ecology Corporation (SEC)/Perma-Fix Environmental Services, Inc. (Perma-Fix), Knoxville, TN, August 1999-Present.

- **Health Physics Specialist, 2006-Present.**

- Provides HP supervisory level support for a variety of projects specializing in radiation protection program implementation; MARSSIM-based final status surveys of buildings and open land areas; Calibrate, Repair & Fabricate a wide assortment of meters for SEC Instrumentation customers.
- Radio-Analytical system set-up and operation to include Canberra gamma spectroscopy systems, ISOCS, Series 5 LBPC, Perkin Elmer Tri-Carb LSC, and various portable bench top sample counters.
- Designed and fabricate specialized survey systems in support radiological characterization of open land areas and indoor facilities
- Served as RSO for several SEC projects conducted under our State of Tennessee Radioactive Material License.

- **Radio-Analyst, Oak Ridge National Laboratory (ORNL), 11/2004-2/2006.**
 - Operated and calibrated Count Room equipment including Packard Tri-Carb Liquid Scintillation Counter, Tenelec LB/5100, and Protean WPC 9550.
 - Operated and maintained Gamma Spectroscopy System using HPGe Detectors with Genie 2000 software.
 - Operated and maintained Canberra In-Situ Object Counting System (ISOCS) using Genie 2000 and LABSOCS software.
 - Calibrated air sampling equipment including PAMs, Low-Vols, and High-Vols.
 - Performed source checks and calibrations on Personnel Contamination Monitors (PCMs).
 - Troubleshoot and repaired PCMs and an array of portable instruments.
 - Conducted Area Routine Surveys of the Count Room and maintained area in an orderly and safe condition.
- **Senior RCT/Verification Technician, ORNL, 5/2004-11/2004.**
 - Performed walkover surveys and instrument QC checks, using Global Positioning System (GPS) to identify survey and sample locations in Melton Valley.
 - Completed bias and systematic soil sampling in accordance with established procedures and protocols to determine that soils meet remediation criteria.
 - Prepared samples for on-site/off-site analysis and documented chain-of-custody.
 - Analyzed survey and analytical data to determine additional data requirements.
- **Senior RCT, ETTP/K-25 Site, 3/2000-5/2004.**
 - Provided job coverage in support of UF-6 cylinder yard projects.
 - Conducted reindustrialization surveys of buildings and areas using MARSSIM methodology.
 - Supported soil sampling operations and surveyed vehicles and equipment for off-site/on-site release.
 - Performed NaI walkover surveys using GPS/GIS technology.
- **Junior RCT, Portsmouth, Ohio, 11/1999-3/2000.**
 - Assigned to DOE waste management/waste characterization projects to provide job coverage in support of waste sampling operations.
 - Regulated the up-posting and down-posting of radiological areas.
 - Surveyed vehicles and equipment for on-site/off-site release.

Training:

- Current NRRPT
- Current DOE Core
- Current DOE RWII
- HAZWOPER 40-Hour with Current 8-Hour Refresher
- Supervising for Safety
- OSHA 10-Hour
- Respirator Fit
- Hazard Communication
- Hazardous Waste Site Safety
- Criticality Safety
- Environmental Sampling

Brian Miller

Radiation Safety Officer

Education/Qualifications:

B.A. Chemistry (cum laude), University of Tennessee–Chattanooga, 1989.

A.S. Health Physics/Industrial Hygiene (magna cum laude), Chattanooga State Technical College, 1993.

Relevant Experience:

Mr. Miller has over 20 years of field and management experience related to radiation protection (RP), industrial hygiene (IH), and environmental remediation activities. He has over 15 years of final status survey (FSS) experience related to open land areas and structures under Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) protocols. He has previously served as the Radiological Protection Manager for the Old Town Demolition (OTD) Project at Lawrence Berkeley National Laboratory (LBNL) and has also served as Assistant Radiation Safety Officer (RSO) and FSS Engineer at the FUSRAP Maywood Superfund Site (USACE) where he managed the design, implementation, and reporting of several hundred MARSSIM Class 1 and Class 2 survey units (SUs). After Maywood, he managed the FSS during decommissioning of a U.S. Nuclear Regulatory Commission (NRC)-licensed fuel fabrication facility in Festus, Missouri with multiple release criteria. These surveys involved non-regular SU geometries including sidewalls and waterways. Afterwards, he managed the FSS during a radium decontamination and retooling effort for three scrap metal shredding and sorting facilities in Ohio and Pennsylvania. FSS reports submitted to State regulators were quickly approved, usually with no comments. More recently, Mr. Miller served as Radiation Protection Specialist for a Canadian project involving remediation of low-level radioactive waste (LLW) soil across several dozen residential properties. Mr. Miller has also recently provided work planning and FSS reporting support for a large-scale cesium-137 recovery effort at a major medical research and training facility in the Pacific Northwest.

During the course of his work, Mr. Miller has been involved with numerous health and safety oversight activities, including excavation permit support, subsurface and overhead utility work, confined space coverage, aerial lift training, lockout/tagout (LO/TO) participation, and quantitative fit testing. He is proficient in the operation of various types of IH workplace monitoring equipment, including direct-reading multi-gas meters (PID/FID), noise dosimetry, real-time dust, WBGT, Dräger kits, etc.

Employment History:

Perma-Fix Environmental Services, Inc. (Perma-Fix), 1996–Present. Relevant projects include:

- **Work Planner/FSS Support Specialist; UW Harborview Research and Training Building Recovery; Seattle, Washington; LANL-Triad; 07/2020-03/2021.** Duties included preparation of work instruction packages (WIPs), survey instruction packages (SIPs), and performance of quality control (QC) reviews of FSS data summaries for over 150 survey units.

RELEVANT EXPERIENCE HIGHLIGHTS

- More than 20 years' radiation protection, industrial hygiene, and environmental remediation experience for government, commercial, and industrial clients, including DOE and USACE.
- Over 15 years of FSS experience related to open land areas and structures under MARSSIM protocols, including two years leadership experience at LBNL.
- Expertise in the collection of air, water, and soil samples; laboratory operations; industrial hygiene; radiological monitoring; facility characterization; and FSS.

Assisted with the preparation of portions of the master FSS report and material and equipment release report for this project.

- **Radiation Protection Specialist; Port Hope, Ontario, Canada; CNL; 05/2019–07/2020 and 04/2021–Present.** Duties included preparation of and subsequent updates of key technical work plans, including radiation protection plan, remedial verification standard operating plan (RVSOP), environmental protection plan, and technical standard operating procedures (SOPs). Supervised a staff of between four and eight radiation protection technicians (RPTs), provided onsite orientation training, and directly interfaced with the client to update schedule status, plan for emergent issues and scope growth, and develop corrective actions as needed for the RP program. Trained RPTs to the RVSOP, tracked FSS data, and prepared remedial verification (FSS) reports for client review.
- **Radiation Protection Lead/Manager; Berkeley, California; LBNL; 08/2017–04/2019.** Mr. Miller's job assignments have included supervising the safe and compliant execution of all RP, radiological characterization, and FSS field activities by a crew of up to seven radiological control technicians (RCTs). He also served as a waste accumulation area (WAA) supervisor performing weekly inspection duties. His position required direct interface with LBNL staff and U.S. Department of Energy (DOE) regulators. He assisted the LBNL Radiation Protection Group (RPG) during a successful due diligence assessment of the Perma-Fix radiation protection program (RPP) and has provided input on radiological decontamination approaches used during the OTD Project remediation, and has overseen the successful implementation of MARSSIM surveys within five soil SUs and five structural SUs at the OTD Site. For each completed SU, he prepared the accompanying FSS report for review by LBNL. All FSS reports were submitted to the client on time and all were approved with minimal to no regulatory comment requiring further response and resolution. He also performed final reviews on all radiological surveys, including routine scoping, waste transportation, unrestricted release, sample release, and airborne radiological sampling records. Mr. Miller has prepared several radiological hazard reviews (RHRs) covering routine inspections, demolition, remediation, and wastewater treatment. He has prepared new procedures and instructions covering radiological worker training and FSS implementation and also has assisted with development of several job hazard analyses (JHAs) ensuring RHR and RPP requirements were addressed fully. Mr. Miller routinely led plan of the day (POD) and end of shift (EOS) meetings with LBNL and crew members and provided RPP status updates for weekly schedule meetings.
- **FSS Manager; Massillon, Ohio/Beaver Falls, Pennsylvania (ODH, PADEP); 03/2016–12/2016.** Authored Decontamination work plans for three sites while interfacing with Ohio and Pennsylvania state regulators to resolve comments quickly. Developed a MARSSIM-based release plan for on-site structures, open land, and complex scrap metal sorting equipment, including conveyors, hoppers, magnetic separators, cyclones, and induction sorting systems. Prepared FSS reports that secured release of hundreds of SUs with little to no regulatory comment. Supported state regulators during their performance of on-site confirmatory surveys. Received LO/TO and aerial lift training and was successfully quantitative fit-tested.
- **Site FSS Manager; Festus, Missouri (Westinghouse–NRC); 09/2014-01/2016.** Supervised a crew of five senior RPTs during the decommissioning phase of an NRC-licensed fuel fabrication plant. Authored FSS plans, revised FSS procedures, and prepared reports for Westinghouse and NRC, releasing dozens of SUs—both open land and structural. Tracked progress milestones to facilitate invoicing in a fixed unit rate environment. Worked with NRC and Westinghouse to resolve requests for information (RFIs) pertaining to procedures and technical implementation of FSS.

- **Assistant RSO/MARSSIM Engineer; Maywood, New Jersey (USACE); 01/2003–12/2013.** Radiation Protection (RP) Duties: Administered Radiation Worker II training to new project employees over the course of 10 years. Periodically administered quantitative fit testing routine to site workers. Supported site respiratory maintenance, storage, and training program. Assigned and tracked personnel dosimetry. Provided on-the-job RPP training to new RPTs. Supervised a field RPT staff of over 20 to ensure compliance with site procedures, primarily focusing on active excavation safety. Oversight field walkdowns included checks for proper access control and postings, air monitoring, dust suppression, gamma scanning technique, soil sampling, conveyance (U.S. Department of Transportation [DOT]) surveys, and overall crew compliance to RP requirements and as low as reasonably achievable (ALARA) principles. Authored several operating procedures for various types of IH monitoring equipment routinely used by site RPTs. Performed on-site calibrations and troubleshooting for IH instrumentation. FSS duties included coordinating with the Project Certified Health Physicist (PCHP) to design, execute, and document field FSS events consistent with MARSSIM protocols and site-specific FSS plan requirements, as well as supervising FSS field technicians responsible for all facets of sample collection, data tracking, and close-out reporting related to FSSs. He also reviewed air, wastewater, and soil sampling data and recommended corrective actions.
- **Project Health Physicist/Radiation Safety Officer; Gloucester City, New Jersey (USACE/EPA); 04/2002–12/2002.** Supervised setup of on-site RP office from project inception. Managed crew of field and laboratory RPTs to ensure compliance to USACE and U.S. Environmental Protection Agency (EPA) Project Safety and Health Plan. Interfaced with client to ensure quality assurance (QA)/quality control (QC) objectives were met with regard to radiological data deliverables. Performed general administration functions including payroll preparation, employee evaluations, accounts management, and disciplinary actions. Administer Radiation Worker Training and ongoing radiation safety topics. Oversaw/ trained field RPTs to implement FSSs using the MARSSIM methodology, NUREG/CR-1575.
- **Assistant RSO/Deputy Project Manager; Maywood, New Jersey (USACE/FUSRAP); 10/1996–03/2002.** Provided safety and health oversight of field remedial and investigative activities to ensure compliance with the USACE approved Site Safety and Health Plan. Operated, maintained, and troubleshoot field IH and radiological monitoring instruments. Responsible for the collection, preparation, and analysis of environmental and occupational air, water, and soil samples in accordance with USACE, Occupational Safety and Health Administration (OSHA), DOT, EPA, and New Jersey Department of Environmental Protection (NJDEP) standards and protocols. Operated gamma spectroscopy and proportional counting equipment. Supported radioactive waste shipping activities. Supervised field technicians and provided technical guidance in the performance of their duties. Designated as adjunct Site Radiological Safety Officer and Project Manager.
- **Project Manager/Health Physics Supervisor; Deepwater, New Jersey; Du Pont Site.** Provided safety and health oversight during D&D of process buildings. Supervised a crew of eight technicians during operation, maintenance, and troubleshooting of field IH and radiological monitoring instruments. Responsible for the collection, preparation and analysis of environmental and occupational air, water, and soil samples in accordance with DOE, OSHA, DOT, EPA, and NJDEP standards and protocols. Supported radioactive waste shipping activities. Authored procedures implemented to support field ES&H functions. Reviewed and maintained site ES&H records in accordance with approved QA plans.
- **Lead Radiological Control Technician; Middlesex, New Jersey; Middlesex Sampling Plant.** Provided radiological and IH support during soil load-out activities associated with the Middlesex Municipal Landfill pile. Supported load-out of approximately 15,000 cubic yards of

uranium and radium-contaminated soil and debris. Conducted radiation, contamination, and airborne surveys.

- **Site Manager/Health Physics Supervisor; Beverly, Massachusetts; Ventron Site.** Provided radiological and IH support during soil remediation efforts of Ventron site as well as Salem Harbor. Performed gamma walk-over surveys, pre- and post-excavation surveys, air sampling surveys. Supervised crew of six technicians. Served as company Site Manager.

Lead Health and Safety Technician; Thermo NU-Tech; New Brunswick, New Jersey; New Brunswick FUSRAP Site. Collected and packaged soil samples supporting chemical characterization of the site under Bechtel National Inc. Performed gamma walkover surveys.

Radiological Control Technician; Thermo NU-Tech; Wayne, New Jersey; Wayne Interim Storage Site. Provided radiological and IH support during soil excavation activities. Conducted radiation, contamination, and airborne surveys.

Training:

- 40-Hour MARSSIM Implementation
- OSHA 8-Hour HAZWOPER
- DOE Radiological Control Technician
- OSHA 40-Hour HAZWOPER
- OSHA 8-Hour HAZWOPER Annual Refresher
- DOE RCT
- DOT 49 CFR Parts 172, Subpart H (HM-181/126F)
- Fall Protection
- Confined Space
- Industrial Hygiene Techniques
- Operation of Mobile Platforms
- Asbestos Awareness
- LO/TO
- Aerial Lift



Shouvik Gangopadhyay– Deputy Program Manager/Environmental QC Manager

Years of Experience: 31 Years

With Current Firm: 28 Years

Education:

- MS, Biomechanical Engineering, 1993
- BS, Energy Engineering, 1990
- Project Management Excellence Certification, Northeastern University, 2008

Other Professional Qualifications:

- PMP: (#321437), 03/20/06
- 40-Hr HAZWOPER, 1994; 8-Hr Refresher, 2015

Languages | Clearance | Special Qualifications (years in the military, etc.)

- Languages: English, Hindi, Bengali

SUMMARY OF EXPERIENCE

Mr. Gangopadhyay has 31 years of environmental remediation experience, including management of large, complex environmental programs with a total value in excess of \$180M. These programs have been highly visible with multiple stakeholder interactions, including the community and have required extensive reporting pertaining to project progress, environmental monitoring and control, and H&S protection processes. His experience includes cradle-to-grave activities from conducting environmental assessments, preparing environmental management and protection plans, remedial action plans, characterization and delineation work plans, and site investigation reports, designing solutions for remediation and restoration projects, regulatory interpretation, and excavation, storage, and treatment/disposal of hazardous wastes and restoration of sites. His remedial technologies expertise includes landfill construction, waste stabilization and placement, off-site disposal, bioremediation, chemical oxidation, and thermal treatment.

PROJECT EXPERIENCE

Senior Project Manager/QC Manager, Defense Construction Canada, Remedial Services for PHC Soil, Sediment, and LPH (Various Projects), Goose Bay, NL, \$31.5M (2013-Current) Responsibilities:

Managed seven projects involving investigation/characterization, delineation, and remediation of PHC- and LPH-impacted soil and sediment via bioremediation, chemical oxidation, mechanical separation, off-site disposal, and, in one case, remediation of PCB via soil washing. Responsibilities: Developed the project remediation approach, cost estimate, schedule, and DCC-approved project planning documents. Managed setup of the process for the first large treatment program at 5 Wing to ensure that any issues were proactively confronted and mitigated. Ensured integration of local suppliers and subcontractors and voluntarily tracked and reported employment of First Nation personnel. Continues to facilitate integration between field crew and remediation specialist to ensure that treatment processes are being optimized as required. Monitored schedule and QA/QC system. Reports monthly progress along with any required corrective action. Treated contaminated water from excavation and treatment areas to meet the Canadian Council of Ministers of the Environment criteria for non-aquatic life bearing waters, with benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations in the treated water consistently below discharge criteria.

Senior Project Manager, Canadian Nuclear Laboratory, Various Projects, Port Hope, ON, \$115M

Responsibilities: Responsible for management oversight of scope, schedule, and budget related to Port Hope projects. Worked closely with CNL's contract to ensure compliance; arranges the necessary resources for project team to execute planned work; supervises long-term planning of project; proactively highlights potential issues to client for timely resolution; and ensures schedule milestones are met.

Project Sponsor, Canadian Nuclear Laboratory, Port Hope Early Works 3a (EW3a), Port Hope, ON State, \$399M (09/2015-04/2016). Responsibilities: Serve as the primary contact responsible for oversight and client alignment of this \$3.99M project for CNL involving excavation and relocation of low-level radioactive waste (LLRW). Contaminants included uranium, radium 226, arsenic, and others. ***SOW:*** The scope consists of site preparation, well abandonment, excavation, and stockpiling in designated locations and restoration of the site in accordance with the technical scope of work. Ensured that project team aligned with client objectives. Provided additional resources to mitigate issues as they arose to keep



project on track. Managed team through development of project schedule, tracking, and recovery from delays.

Senior Project Manager, Canadian Nuclear Laboratory, Solidification and Stabilization of Contaminated Sediments, Sydney Tar Ponds, Nova Scotia, \$75M Responsibilities: Developed and implemented the approach, cost estimate, P3 schedule, resourcing plan, and approved project planning documents for this \$75M project, including soil and sediment stabilization, capping, synthetic-lined channel construction, and infrastructure installation at a site contaminated by former steel mill operations. Managed and oversaw treatment operations to ensure that the stabilization process was being implemented effectively through adjustment of recipes as well as adapting alternate mixing methods when required. Managed schedule to ensure that project was completed ahead of projections despite weather and site-related impacts. Worked with the Agency and the owner's representative to ensure that changes to the scope were handled to provide the best value for the client. Ensured that contract specifications were handled with no deviations, resulting in scores above 95% for various quality indicators. **Accomplishments:** Received praise from the Agency and Public Works for completion of the project ahead of schedule and under budget.

Senior Project Manager/Remediation Specialist, US Air Force – HQ Air Combat Command, DB Restore-Remediate Contract, Moody Air Force Base, GA \$9.2M (09/20007-09/2013) Responsibilities: Managed project, including remedial design, closure, and optimization of 12 sites contaminated with PHC, chlorinated solvents, and landfill debris. Prepared strategies to reduce long-term liability through site closure or exit strategies incorporating optimization of remedial and post-remedial activities. Managed design, implementation, and optimization of soil and groundwater remedial activities, including excavation and stockpiling, landfarming, bioremediation, and chemical oxidation. Supervised long-term monitoring and annual reporting of all site data to include recommendations for reduction of efforts. Optimized treatment systems to minimize life-cycle cost and accelerate shutdown and negotiated remedial approaches and optimization with regulatory agency. Presented project updates to regulatory agencies at public meetings. **SOW:** Providing investigations, closure designs, and construction activities at all sites. This includes execution of all health and safety and quality control requirements, as well as hazardous waste management. Affected sites include three landfills, a surface disposal site, a fill site, a service station, an engine maintenance shop, a vehicle maintenance shop, a former fire training area, a flight line apron, a flight line stormwater outfall, and a TCE plume at the base golf course. The primary remedial approach for the chlorinated solvent sites is in-situ bioremediation (principally reductive dechlorination) coupled with monitored natural attenuation. **Accomplishments:** Received a safety award for the National Safety Council for 39,610 employee hours without injury or illness involving days away from work.

Senior Project Manager/Remediation Specialist, USACE-NAE, Remedial Investigation, Feasibility Study and Remedial Design Activities, Otis AFB, Massachusetts, \$39M (03/2003-04/2011).

Responsibilities: Managed project for remediation and closure of multiple sites under a US National Priorities List program. Led 50 on-site personnel and 25 subcontractors during design, construction, and installation of three soil vapor extraction (SVE)/air sparging systems, and the excavation, transportation, and disposal of 49 sites contaminated with PHC, chlorinated solvent, pesticides, poly-aromatic hydrocarbons, and metals. Set up and conducted periodic meetings with client and agencies to accelerate review time and facilitate site closure. Supervised creation of closure reports, which facilitated de-listing and closure of sites. Optimized treatment systems to minimize life-cycle cost and accelerate shutdown. Met multiple enforceable milestone dates to avoid liquidated damages. Met contract specifications with no quality deviations or re-work. **SOW:** ECC provided QC of all ground and aerial geophysics and GIS that was performed by the subcontractor. Geophysical instruments were utilized during operations in support of investigation of suspect disposal trenches that were speculated to contain propellant bags. GIS was used to help scope sampling location, MEC study areas, to support density predictions and to support soil excavation. More than 5,122 MEC items were located and stored in the site database to allow for GIS querying and analysis. MEC and MD finds were spatially overlaid in a GIS mapping system to determine



and differentiate munitions training areas and testing areas for multi-use range areas. MEC work was conducted in support of well pad clearance, access road clearance, and construction clearance. Avoidance support was provided during the collection of soil samples and installation of profile borings and monitoring wells. Location, detection, identification, removal, and disposal of MEC items were performed as a support component to all aspects of the project. Work plans for MEC assessment; evaluation of data to predict residual MEC, remediate MC-contaminated soil, MEC removal, and an ESP were submitted on time with no regulatory issues or concerns. Investigation activities included MC site assessment and investigation; ground-based geophysical surveys; MEC density and hazard analysis; feasibility studies; and groundwater modeling in support of soil and groundwater characterization.

Accomplishments: OSHA - ECC received Voluntary Protection Program Star Status from OSHA-the first small business environmental remediation firm to be given the designation. (ECC has since become a large business.) Subsequently, ECC received the Gold Star Among Stars award from OSHA Region 1, given for attaining safety records 90 percent better than Bureau of Labor Statistics. EPA - EPA issued several administrative orders requiring compliance with Safe Drinking Water Act regulations as well as CERCLA and Massachusetts Contingent Plan regulations.

Contract Number | TO Number | ECC Project Number

Quality Manager, USAF, Landfill No. 4 Cover Renovation, Warner Robbins AFB GA, \$5.9M

Responsibilities: Managed QC for installation of a new cover on Landfill 04, which included demolition of existing structures, clearing 39 acres, importing 21,300 sq meters of fill, installing 428,000 mP³P of 7-oz Geotextile, 17,000 square meters 13-oz Geotextile, and 34,002 sq meters. Supervised three QC personnel overseeing subcontractors providing geotechnical services (field sampling, standard operating procedures, and testing); drilling monitoring well; constructing of concrete pad according to design specifications; installing the security fence; and supplying the geosynthetic liner for the landfill geotechnical testing program which involved more than 1,000 samples. Supervised and coordinated the liner material acceptance testing program which required review of QC data for each of the six layers of liner material. Participated in preparatory meetings with Air Force Environmental Management personnel, subcontractors and third-party consultant prior to initiation of major project activities. Prepared and/or reviewed all submittal prior to transmittal to the US Air Force.

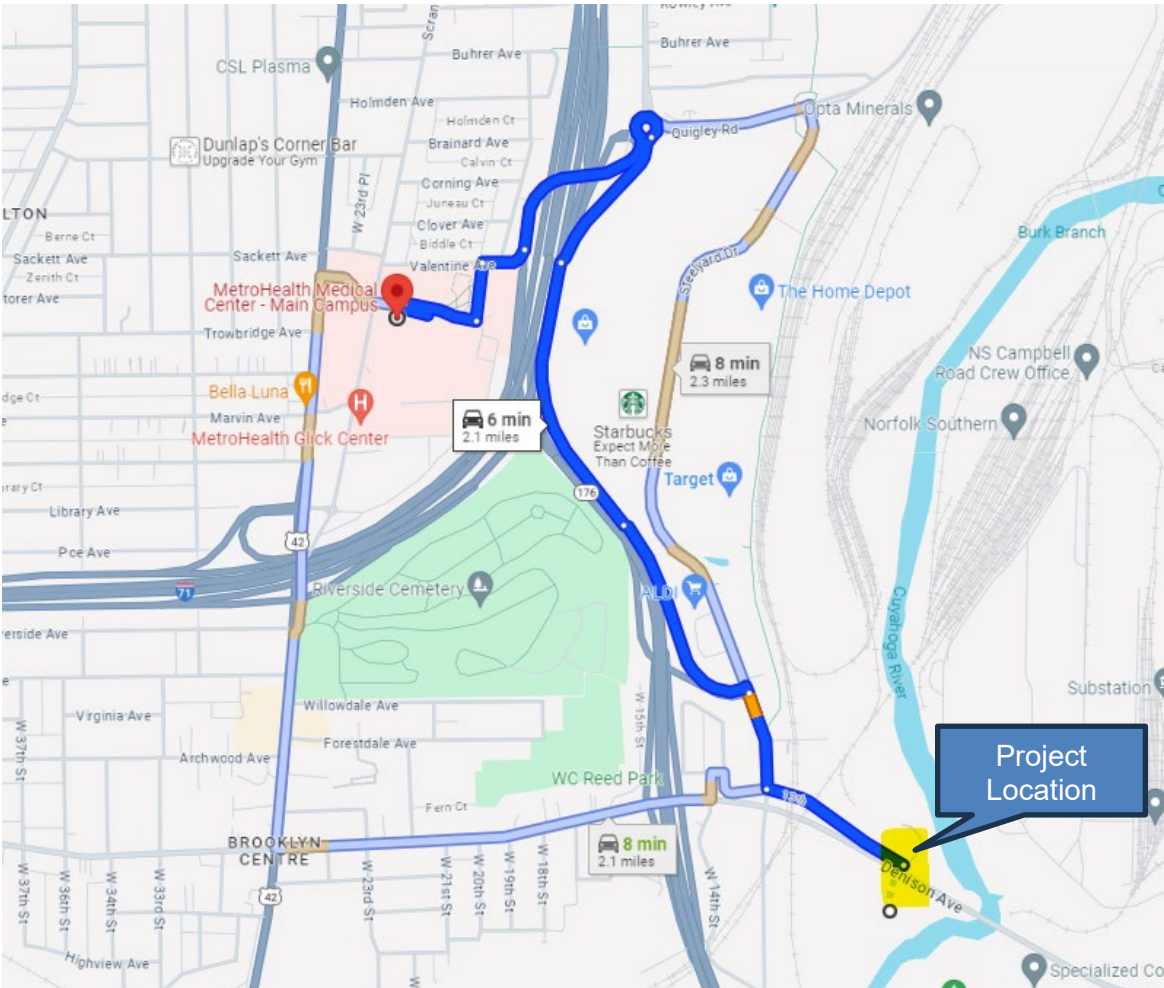
Appendix E
Emergency Contact List

This page intentionally left blank.

EMERGENCY CONTACT LIST
Former Harshaw Chemical, Cleveland, OH

AGENCY	AFFILIATION		TELEPHONE
Fire/Police/EMS	Cleveland, Ohio		911
Hospital - ER (24/7)	MetroHealth Medical Center 2500 MetroHealth Dr. Cleveland, Ohio 44109		216-778-7800
Occupational Health Clinic (M-F 9-5)	Concentra 4660 Hickley Industrial Pkwy Cleveland, OH 44109		216-749-2730
Occupational Medical Consultant	Dr. Peter Greaney, MD WorkCare, Inc.		800-455-6155
Poisoning	U.S. Poison Control Center		800-222-1222
USCG (Spills)	National Response Center		800-424-8802
Client Project Contacts - In Order, Chain of Command for Reporting Emergencies			
NAME	POSITION	AFFILITATION	TELEPHONE
1. David Bala	COR	USACE	(C) 216-701-5208
2. Mark Legaza	Health Physicist	USACE	(O) 716-879-4106 (C) 716-997-6001
3. Marc Graham	Health Physicist	USACE	(C) 716-863-9288
4. Joe Kolat	Acting Chief OAO	USACE	(O) 216-685-1213 (C) 440-479-7275
5. Matthew Snyder	Construction Branch Chief	USACE	(C) 216-701-4711
6. Mike Polek	District SO	USACE	(O) 716-879-4321 (C) 716-913-8867
7. Frank D'Andrea	Contracting Officer	USACE	(O) 716-879-4245
8. Emergency Management Office		USACE	716-879-4160
9. USACE Emergency Mgmt. (24-hr)		USACE	716-879-0395
Other Client Project Contacts			
Richard Whipple	Project Manager	USACE	716-879-4490
Lindsay Heck	Industrial Hygienist	USACE	716-879-4343
Neil Miller	Environmental Branch Chief	USACE	716-364-4607
EFS			
Marc Mizrahi	Program Manager	EFS	973-202-8776
Rick Woodworth	Project Manager	EFS	215-776-0629
Alen Trpevski	Project Manager	EFS	716-818-3390
Ben Blasingame	Project Manager	EFS	412-249-2285
Brianne Hastings	Project Manager	EFS	412-249-3117
Clark Evers	FUSRAP RPM	EFS	314-770-3029
Shouvik Gangopadhyay	Site Superintendent	EFS	508-274-7039
Yong McGuire	SSHO	EFS	720-666-8224
Kym Edelman	Safety Director (SHM)	EFS	757-435-5384
Nick Rood	Safety Manager	EFS	910-915-9679

MetroHealth Medical Center



1000 Harvard Ave
Cleveland, OH 44109

Get on OH-176 N

-
- ↑ 1. Head northwest on Old Denison Ave toward Jennings Rd 3 min (0.7 mi)
- ⚠ Partial restricted usage road
-
- ↪ 2. Turn right onto Jennings Rd 0.2 mi
-
- ⬆ 3. Turn left to merge onto OH-176 N 0.1 mi
-
- 0.3 mi

Continue on OH-176 N to Valentine Ave. Take the I-71 exit from OH-176 N

2 min (1.0 mi)

- ⬆ 4. Merge onto OH-176 N
0.4 mi
- ↪ 5. Keep right, follow signs for I-71/W 14th St
0.2 mi
- ⤿ 6. At the traffic circle, take the 3rd exit onto the Valentine Ave ramp to W 14th St S
0.4 mi

Drive to W 23rd Pl/Metrohealth Dr

- ↪ 7. Turn right onto Valentine Ave (signs for I-71 S)
2 min (0.3 mi)
- ↵ 8. Turn left toward W 23rd Pl/Metrohealth Dr
371 ft
- ↪ 9. Turn right onto W 23rd Pl/Metrohealth Dr
459 ft
- ↶ 10. Sharp left to stay on W 23rd Pl/Metrohealth Dr
0.1 mi
- [Destination will be on the right](#)
233 ft

MetroHealth Medical Center - Main Campus

2500 Metrohealth Dr, Cleveland, OH 44109

Appendix F
Site Safety and Health Plan

This page intentionally left blank.

FINAL SITE SAFETY AND HEALTH PLAN

Former Harshaw Chemical Site, Remediation of Operable Units 1 and 2 Cleveland, OH

Contract No: W912P424C0002

Delivery Order W912P423R0019

May 2024

Prepared for:



USACE Buffalo District

478 Main Street

Buffalo, New York 14202

Prepared by:



Enviro-Fix Solutions LLC

1240 Bayshore Highway, Suite 311

Burlingame, California 94010

Phone: 650-347-1555 / Fax: 650-347-8789

This page intentionally left blank.



TABLE OF CONTENTS

Section	Page
1.0 PROJECT / TASK ORDER DESCRIPTION	3
1.1 Site History and Description	3
1.2 Scope of Work	4
2.0 ACTIVITY HAZARD ANALYSIS	4
3.0 STAFF ORGANIZATION, QUALIFICATIONS AND RESPONSIBILITIES	5
4.0 TRAINING	5
5.0 WORK ZONES	5
6.0 PERSONAL PROTECTIVE EQUIPMENT	6
6.1 Levels of Protection	6
6.2 Selection	8
6.3 Use and Limitations	9
6.4 Work Mission Duration	10
6.5 PPE Maintenance and Storage	10
6.6 PPE Decontamination and Disposal	11
6.7 PPE Training and Proper Fitting	11
6.8 PPE Donning and Doffing Procedures	11
6.9 PPE Inspection Procedures	11
6.10 Evaluation of Effectiveness of PPE Program	12
7.0 MEDICAL SURVEILLANCE	12
7.1 General	12
7.2 Special Medical Exams and Biological Monitoring	12
8.0 EXPOSURE MONITORING AND AIR SAMPLING	12
9.0 HEAT AND COLD STRESS	14
10.0 STANDARD OPERATING PROCEDURES	14
10.1 Site Rules/Prohibitions	14
10.2 Work Permit Requirements	15
10.3 Material Handling Procedures	15
10.4 Drum/Container/Tank Handling Procedures	15
10.5 Comprehensive AHA of Treatment Technologies	16
11.0 CONTAMINATION CONTROL, SANITATION AND WASTE MANAGEMENT	16
11.1 Personal Hygiene and Decontamination Procedures	16
11.2 Equipment Decontamination Procedures	16
11.3 Engineering and Special Work Practices	16
11.4 Materials Management	16
12.0 EMERGENCY PLANNING	16
13.0 PRE-ENTRY BRIEFING	16
14.0 EFFECTIVENESS OF PLAN	16
15.0 REFERENCES	17



LIST OF ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
COC	Chemical of Concern
DFOW	Definable Feature of Work
ECC	Environmental Chemical Corporation
EFS	Enviro-Fix Solutions LLC
GDA	Government Designate Authority
LEL	Lower Explosive Limit
mg/m ³	milligrams per cubic meter
NIOSH	National Institute for Occupational Safety and Health
OH	Ohio
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PPM	Parts Per Million
ROD	Record of Decision
RPP	Radiation Protection Plan
SHM	Safety and Health Manager
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SSHS	Site Safety and Health Supervisor
SSHP	Site Safety and Health Plan

LIST OF TABLES

Table 1-1	Maximum and Background COC Concentrations in Soil
Table 6-1	Task-Specific Personal Protective Equipment
Table 8-1	Exposure Monitoring and Air Sampling



1.0 PROJECT / TASK ORDER DESCRIPTION

Contract Number: **W912P4-24-C0002**

Project Name: **Former Harshaw Chemical Company Site**

Location: **Cleveland, Ohio**

This Final Site Safety and Health Plan (SSHP) supplements the Accident Prevention Plan (APP) for the Former Harshaw Chemical Company Site Project in Cleveland, Ohio, and contains project/task order specific information. Additional safety and health requirements are found in the Activity Hazard Analyses (AHAs), supplemental plans and Environmental Chemical Corporation (ECC) Safety and Health Standard Operating Procedures (SOPs), attached to or referred to within the APP.

If hazards or conditions are identified that are not covered by this Appendix, the Enviro-Fix Solutions LLC (EFS) staff must contact the project manager or the Site Safety and Health Officer (SSHO) for assistance in amending the SSHP.

1.1 Site History and Description

Refer to Section 2.0 of the APP for a general description of the overall project. The following is a description of the environmental contamination which could possibly be encountered during execution off the project.

FUSRAP Contamination

FUSRAP constituents of concern (COCs) for OU-1 and OU-2 soils include radium (Ra)-226, thorium (Th)-230, Th-232, and total uranium (U). Maximum and background levels, identified in USACE investigations, are listed in **Table 1-1**.

Table 1-1

Maximum and Background COC Concentrations in Soil

COC	OU1 Maximum Detected	OU2 Maximum Detected	Mean Background Concentration ^b
Ra-226	19.23	7.98	0.941
Th-230	632	84.5	0.878
Th-232	329	74.8	0.981
U-238 ^c	2710	1680	1.27

Notes:

^a All values in units of picocuries per gram (pCi/g).

^b Mean background values were calculated using natural soil samples from 0 to 13 ft below ground surface.

^c U-238 was used as a surrogate for total U.



RCRA Contamination

According to the PWS, Section 4.3.5.2.1, a Description of Current Conditions report identified 37 SWMUs and eight areas of concern at the site from historical documents. Site inspections conducted in 2007 and 2010 determined that most were no longer present and/or no impacts were observed. Laboratory analyses for non-radiological constituents have historically been limited to inorganics associated with former site processes and waste materials. Elevated constituents in soil include nickel, chloride and sulfate, which were associated with nickel chloride/nickel sulfate production. Of the constituents identified in soil, nickel is the most prevalent.

The USACE RI analyzed soil samples for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and inorganic constituents. Polycyclic aromatic hydrocarbons (PAHs) were detected along with low levels of other SVOCs and certain VOCs

USACE has requested sampling of support trailers and vehicles during on site work activities to document potential residual lead and nickel that may be present on ground surfaces at the Project site.

1.2 Scope of Work

See Section 2.1 of the APP for the scope of work. The ROD-selected remedy is complete removal of FUSRAP-contaminated soil from OU-1 and OU-2 and off-site disposal at a properly permitted or licensed facility.

The OU-1 remedy includes the following additional requirements:

- All private utilities encountered during the remedial action will be decommissioned and sealed to prevent the migration of residual uranium in groundwater.
- Any public utilities encountered during the remedial action will be left in place and backfilled with amended material to minimize the migration of groundwater and uranium transport along the utility trenching.

2.0 ACTIVITY HAZARD ANALYSIS

Section 9 of the APP describes the Risk Management Processes and the development of Activity Hazard Analyses (AHAs) for each task to be completed in the DFOWs. AHAs will be developed before each task on an incremental basis throughout the duration of the project. The AHAs will be revised for site-specific activities and reviewed with work crew personnel before commencing any work tasks.

Table 1-1 identifies the constituents of concern for this project. Air monitoring requirements related to radiological contamination are discussed in the Radiation Protection Plan. Monitoring for hazardous atmospheres (i.e., O₂, LEL, H₂S, and CO), nickel, and lead is covered in Section 8 of this plan.

The primary concern during most aspects of this project is the inhalation and/or ingestion of radioactive dust particles. To protect workers from this potential, respiratory protection will be



utilized for operations that have a potential for generating air contaminants in excess of allowable exposure limits.

Skin contamination is also considered a primary concern. To protect workers from this potential, PPE will be utilized when handling or coming into contact with radioactive materials, or entry into any areas controlled for surface contamination.

Workers will wear specified appropriate protective equipment for protection against dermal contact with radioactive loose surface contaminants. Deliberate ingestion and inhalation of contaminants is highly unlikely. However, work habits and contamination area controls will be taken seriously and given the utmost attention in order to reduce the potential for inadvertent skin contamination and or ingestion/inhalation during work tasks not requiring respiratory protection. Additionally, no eating, drinking, smoking, or chewing will be allowed inside of the Exclusion Zones, Contamination Reduction Zones, or any radiologically posted areas.

3.0 STAFF ORGANIZATION, QUALIFICATIONS AND RESPONSIBILITIES

See Section 4 of the APP.

4.0 TRAINING

See Section 5 of the APP.

5.0 WORK ZONES

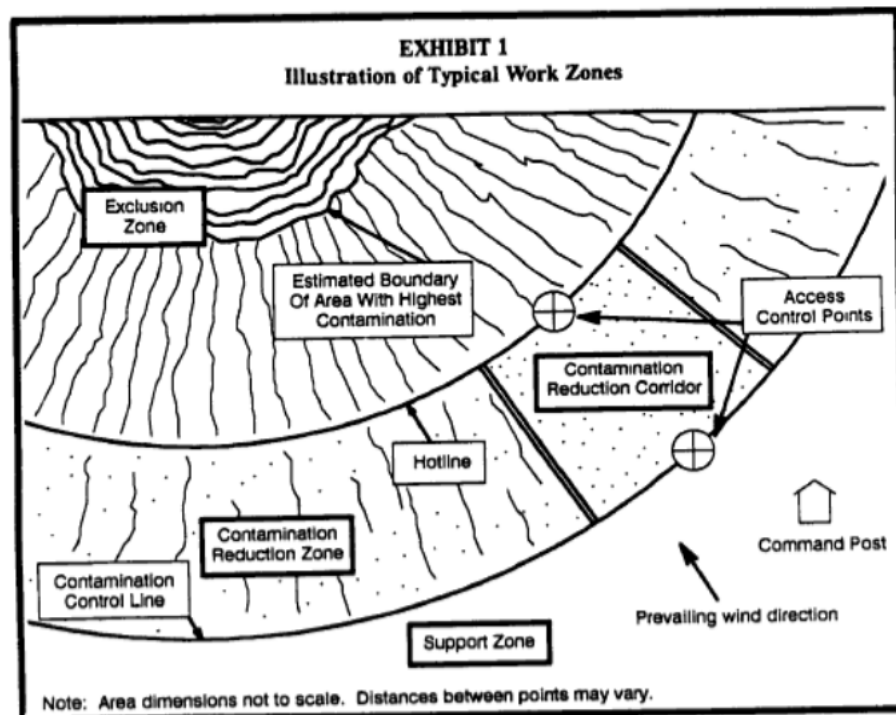
Work zones are an essential element of any hazardous waste site and are established primarily to reduce the accidental spread of hazardous substances by workers or equipment from contaminated areas to clean areas. For this project, work zones will be established as follows:

- The exclusion zone (or hot zone): work area with actual or potential contamination and the highest potential for exposure to hazardous substances. Employees working in this area must be in the required level of PPE, as required by this plan. Employees enter this area via the support area where PPE is donned, through the contamination reduction zone.
- The contamination reduction zone (or warm zone): transition area between the exclusion and support zones. This area is where employees enter and exit the exclusion zone and where decontamination activities take place, and PPE is doffed, as employees exit the exclusion zone when work is finished, then transition to the support zone. Employees enter this area through the PPE donning area of the support zone, once the appropriate PPE ensemble is donned, to work in the Exclusion zone.
- The support zone (or cold zone): the area of the site that is free from contamination and that may be safely used as a planning and staging area. Donning of PPE generally occurs in this area. Break areas are also established in this area, as well as hygiene facilities.



- HAZWOPER defined control zones will be posted in concert with the various radiological zones identified in the RPP and will be established as practical in areas at the work site that are active. Refer to APP Figure 2-3 for more details.

The general layout of the zones will be similar to the graphic below:



Upon mobilization, work zones will be clearly established and delineated, to ensure employees are protected from risk of contamination spread, outside work areas.

Decontamination procedures are detailed in the 'Decontamination Plan' under separate cover.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Levels of Protection

The following is a description of the PPE that may be required during various phases of the project. The U.S. EPA terminology for levels of PPE is used (e.g., Levels A, B, C, and D). AHAs shall specify the determined levels of PPE for each phase of work, which are summarized in Table 1, "Task Protection Levels."

Level A Personal Protective Equipment

Level A PPE is defined by the use of a fully-encapsulating, gas-tight chemical protective suit. The use of Level A protection is not anticipated on this project.



Level B Personal Protective Equipment

The use of Level B protection is not anticipated on this project.

Level C Personal Protective Equipment

Level C protection will be required for initial phases of work where there is potential for inhalation of dust that may contain radiological contamination, lead and nickel which include activities involving excavation and load out of contaminated soil. Level C protection consists of the following PPE:

- Full face or ½ face air purifying respirator equipped with P100 cartridges
- Hardhat meeting ANSI Z89.1 specifications (when working near overhead hazards, during construction activity, or in posted areas)
- Safety glasses with side shields meeting ANSI Z87.1 specifications
- Safety-toed boots meeting ASTM F2412-05/F2413-05 specifications
- Chemical-resistant boot covers and/or outer boots (latex/neoprene)
- Tyvek® coveralls with hoods, elastic wrists, and ankles (as necessary)
- Tychem-QC® or Tychem-SL®, or coveralls with hoods, elastic wrists, and ankles when handling liquids
- Vinyl or nitrile surgical gloves (inner)
- Nitrile, vinyl, or neoprene gloves (outer)
- Hearing protection
- High visibility vests (when working near mobile equipment or vehicular traffic)
- Splash shield (when using pressure washer and as necessary)
- Shin/metatarsal protection (when using pressure washer)

Level D-Modified Personal Protective Equipment

Modified Level D protection will be required for activities where there is a possibility of dermal (skin) contact with contaminated materials, with no inhalation hazard, for tasks such as initial site reconnaissance to collect soil samples and assessing site conditions. Modified Level D protection generally consists of the following PPE:



- Hardhat meeting ANSI Z89.1 specifications (when working near overhead hazards, during construction activity, or in posted areas)
- Safety glasses with side shields meeting ANSI Z87.1 specifications
- Safety-toed boots meeting ASTM F2412-05/F2413-05 specifications
- Chemical-resistant boot covers and/or outer boots (latex/neoprene)
- Tyvek® coveralls with hoods, elastic wrists, and ankles (as necessary)
- Tychem-QC® or Tychem-SL®, or coveralls with hoods, elastic wrists, and ankles when handling liquids
- Vinyl or nitrile surgical gloves (inner)
- Nitrile, vinyl, or neoprene gloves (outer)
- Hearing protection
- High visibility vests (when working near mobile equipment or vehicular traffic)
- Splash shield (when using pressure washer and as necessary)
- Shin/metatarsal protection (when using pressure washer)

Level D Personal Protective Equipment

Level D protection is the minimum level of protection that will be used at the site. Level D PPE shall, at a minimum, consist of the following:

- Work clothing as prescribed by weather
- Hardhat meeting ANSI Z89.1 specifications (when working near overhead hazards, during construction activity, or in posted areas)
- Safety glasses with side shields meeting ANSI Z87.1 specifications
- Safety-toed boots meeting ASTM F2412-05/F2413-05 specifications (over ankle)
- Hearing protection
- Reflective vest a
- Work gloves such as leather, cotton, or other material that provides cut/abrasion resistance (required to be on person)

6.2 Selection

Level D PPE will be used as the minimum level of PPE for the project, during site mobilization / demobilization and other non-intrusive activities where no known contamination is present.

Task specific Personal Protective Equipment is identified in **Table 6-1**, below.



PPE will be adjusted based on the results of air monitoring and action levels noted in **the Radiation Protection Plan**.

Personal protective equipment will be donned on the clean side of the contamination reduction zone only.

**Table 6-1
Task-Specific Personal Protective Equipment**

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Mobilization, Site Preparation, and Demobilization; Backfill and Site Restoration	Level D	n/a	Cut- resistant gloves when handling tools or equipment	None	Hearing protection if >85 dBA; high visibility exterior clothing. As specified in AHA PPE required for chainsaw operations: mesh face shield, safety glasses, chainsaw chaps, hearing protection, high visibility outer clothing; other PPE as specified in the AHA
Demolition of pavement and building foundations; Excavation	Level C	Not anticipated	Cut-resistant outer gloves if handling sharp tools/equipment; Double inner surgical-type nitrile gloves	Full face or ½ face air purifying respirator equipped with P100 cartridges	Hearing protection if >85 dBA, high visibility exterior clothing. As specified in AHA
Sub-surface investigations Operation of Water Treatment system Well decommissioning and installation of new wells	Modified Level D	Not anticipate	Cut-resistant outer work gloves Double inner surgical-type nitrile gloves	None	Hearing protection if >85 dBA; high visibility exterior clothing. As specified in AHA

6.3 Use and Limitations

Users must understand and follow all manufacturer instructions regarding product use and limitations. Below is general guidance in PPE use.



Respiratory Protection – See air monitoring action levels in the Radiation Protection Plan, and site Respiratory Protection Plan.

Body Protection – Wear clothing or disposable garments for activities described above. Secure all closures. Select proper size to avoid tearing, constriction, or tripping/catching on objects. Most disposable coveralls offer only limited protection and should be changed immediately after any splash, immersion or contact with hazardous materials. Inspect frequently.

Hand Protection – Chemical protective gloves are meant for incidental contact. Change gloves in the event of immersion unless specifically selected for that purpose. Inspect frequently and change gloves on signs of contamination and when protection is compromised by wear and tear.

Eye/Face Protection – Discard when protection is scratched or worn impacting visibility. If face shields are worn for chemical splash, also wear splash goggles underneath. Safety glasses will be worn under face shields for impact protection and under welding helmets.

Hearing Protection – Wear hearing protective devices in accordance with manufacturers' instructions, including fitting and insertion. Use of specific devices will be limited to exposures within the noise reduction ratings.

Fall Protection – Wear personal fall arrest systems designated by the applicable AHA. Wear harnesses snug, so that fingers can be placed between body and harness without additional slack. Do not extend lanyards and lifelines beyond acceptable fall clearance distances. Use only designated anchor points, capable of supporting 5,000 lbs. per user, or as approved by a Qualified person.

6.4 Work Mission Duration

Work mission durations will be limited to accommodate acceptable service life of the PPE.

Cartridge change-out schedules will be determined and noted in the Site Respiratory Protection Plan, contained in the APP. If change out is required in less than a full shift, employees must exit the work zone to change cartridges in accordance with the schedule.

Where PPE may cause a hazard, such as heat stress, work mission duration will be determined in the AHA by the SSHO with the assistance of the Safety and Health Manager (SHM). Employees must exit the exclusion zone for rest or monitoring in accordance with the established schedule.

6.5 PPE Maintenance and Storage

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. Employees must inspect, clean, and maintain their PPE according to the manufacturers' instructions before and after each use. Supervisors are responsible for ensuring that users properly maintain their PPE in good condition.

Personal protective equipment must not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible. Where



employees provide their own protective equipment, EFS will be responsible to assure its adequacy, including proper maintenance and sanitation of such equipment.

Maintenance and storage for respiratory protection is contained in the Respiratory Protection Plan in the APP.

6.6 PPE Decontamination and Disposal

All PPE will be disposed of according to federal, State, and Local requirements. Sampling equipment will be decontaminated in accordance with ECC SOP ENV SOP 01.09. Heavy equipment will be decontaminated in accordance with ECC Technical Guideline 02-16.

Decontamination for personnel and equipment is addressed in the 'Site Operations Plan' submitted under separate cover.

6.7 PPE Training and Proper Fitting

Users will be trained on the selection, use and limitations of PPE. Each affected employee will demonstrate an understanding of the training specified in this section and the ability to inspect and use PPE properly, before being allowed to perform work requiring the use of PPE.

Should EFS have reason to believe that any affected employee who has already been trained does not have the understanding and skill required of this section, the employer will retrain that employee.

Gloves, head gear, coveralls, and footwear must fit properly to avoid tripping and snagging hazards, or constriction and tearing. Hearing protection will be checked by the user and SSHO for proper fit and must be inserted / worn in accordance with manufacturer instructions.

Training, use, maintenance and fitting for respiratory protection is addressed in the Respiratory Protection plan contained in the APP.

6.8 PPE Donning and Doffing Procedures

The SSHO will train on and demonstrate proper donning and doffing procedures for PPE ensembles worn in exclusion zones during site orientation.

Personal protective equipment will be donned in the support area only, at a location adjacent to the contamination reduction zone.

6.9 PPE Inspection Procedures

Each person who is required to wear PPE will inspect their equipment prior to, during and after each use. Defective or damaged equipment will not be used. Heavily contaminated PPE that cannot be adequately cleaned will be discarded. Stored PPE will be inspected every month to ensure that it has not been damaged and is suitable for use. Workers who wear PPE in the field will take note of the condition of the PPE worn by their co-workers and inform them of any apparent problems,



such as missing equipment, tears in protective clothing, excessive contamination, improper use of PPE, inadequate PPE, etc.

6.10 Evaluation of Effectiveness of PPE Program

The SSHO will inspect the jobsite each day and as frequently as necessary to ensure that PPE has been properly selected and is being used as designed. The SSHS will also inspect PPE stored for emergency use every month. Similar PPE inspections will be conducted by EFS's SHM during scheduled, quarterly visits of the project site.

7.0 MEDICAL SURVEILLANCE

Employees on this project whose work involves potential exposure to site contaminants will be included in the EFS (ECC) Medical Surveillance Program.

7.1 General

All field personnel will have a current medical exam clearance in accordance with Occupational Safety and Health Administration (OSHA) standards prior to entering regulated work areas in accordance with 29 CFR 1910.120. EFS/ECC uses the services of WorkCare, whose Principal is Dr. Peter Greaney, a Board Certified Occupational Physician to review all exams and provide the clearances, which include an assessment of employee ability to wear PPE safely. Complete results of each individual's medical examination results are maintained by the medical provider and will not be kept on site. The SSHO will ensure appropriate subcontractor's medical screenings are completed, documented, and the physician's written clearances are available at the work site.

7.2 Special Medical Exams and Biological Monitoring

No special biological testing or examination is anticipated for this project. In the event of exposure, appropriate protocols will be followed per the recommendations of the EFS's Corporate Medical Consultant.

8.0 EXPOSURE MONITORING AND AIR SAMPLING

Table 8-1 below lists the general monitoring requirements for hazardous atmospheres that may be encountered in excavations or confined spaces as well as surface sampling for lead and nickel in decon areas and support areas. All direct and integrated air monitoring equipment will be properly calibrated before and after each period of use in accordance with the manufacturer instructions and standard industrial hygiene practice.

Radiological monitoring and associated action levels are addressed in the Radiation Protection Plan.

PPE will be adjusted based on the results of air monitoring and action levels noted in **Table 8-1** below, as well as those outlined in the Radiation Protection Plan.



**Table 8-1
Exposure Monitoring and Air Sampling**

Instrument / Contaminant	Frequency/Location	Action Levels	Actions/Upgrade and Rationale
Multi-gas detector	During confined space entry; in excavations immediately adjacent to sources of exhaust from internal combustion engines. Breathing Zone and inside heavy equipment cabs as indicated.	>10% LEL <19.5 or >23.5% O ₂ (sustained) CO > 15ppm H ₂ S >5 ppm	Stop work and leave area, contact Program SHM/ CIH to develop action plan and evaluate need to adjust PPE.
Personal sample pumps/NIOSH 7303 method Lead	Breathing Zone of 25% of most at risk employees, during excavation activities and downwind of site perimeter, for the first 10 days of operations.	> 30 ug/m ³ > 50 ug/m ³	Implement dust control measures to eliminate all visible dust Stop work and consult with CIH to determine corrective actions and need to implement additional PPE/controls
Personal sample pumps/NIOSH 7303 method Nickel	Breathing Zone of 25% of most at risk employees, during excavation activities and downwind of site perimeter, for the first 10 days of operations.	>500 ug/m ³	Implement dust control measures to eliminate all visible dust Stop work and consult with CIH to determine corrective actions and need to implement additional PPE/controls
Wipe samples for Nickel and lead	Indoor surfaces in decon areas, and support areas, if lead/nickel are detected during air monitoring activities during excavation.	Based on EPA Criteria for Lead: Floors: 10 micrograms per square foot (µg/ft ²) Interior windowsills: 100 µg/ft ² Window troughs: 400 µg/ft ² These standards are for single-surface samples	Stop work, evaluate decon processes, thorough decon of support areas

All air monitoring instrumentation will be maintained and calibrated by trained personnel according to the applicable National Institute for Occupational Safety and Health (NIOSH) / OSHA analytical methods and the manufacturer's recommendations. Where samples are collected for laboratory analysis, EFS will utilize the services of a laboratory accredited by the American Industrial Hygiene Association (AIHA) to analyze the samples in accordance with standard NIOSH or OSHA methods.



Records will include the date, time, substances or hazards monitored, person conducting monitoring, calibration date and method, operations and location of monitoring, and results. An air monitoring data sheet will be completed for each day of operations at the site when monitoring is conducted. Results will be provided to employees. Records are available to employees, their representatives and to the Government Designated Authority (GDA).

9.0 HEAT AND COLD STRESS

See APP Section 8.19.

10.0 STANDARD OPERATING PROCEDURES

The following procedures will be employed on this project where appropriate.

10.1 Site Rules/Prohibitions

The following site rules are applicable to all EFS projects:

- Eat, drink, use gum or tobacco products, or apply cosmetics in designated areas only.
- Do not smoke within site areas or near flammable or combustible materials; areas shall be marked where smoking is permitted.
- Use the buddy system when working in Exclusion Zones. Know who your buddy is, communicate regularly with each other and be alert to signs of distress in your buddy.
- Wash hands, face, and any exposed skin during decontamination, before eating, drinking or using tobacco products, and at the end of each shift.
- Participate in Daily Safety Tailgate Meetings.
- Continually observe work location and be alert to changes that may affect safety.
- Avoid direct contact with contamination by not purposefully walking, touching, or contacting any obviously contaminated surfaces.
- Immediately report any mishaps, including near misses, or unusual situations to SSHO.
- Use PPE provided and as instructed by the SSHO.
- Avoid hand-to-mouth or hand-to-face activities.
- Testing and monitoring instruments, safety equipment, rigging, hand and power tools, vehicles and mobile construction equipment shall be inspected prior to use.
- Minimize the number of personnel in a work area to reduce potential exposures.
- Work within physical and mental limits.
- Take adequate rest breaks and replace body fluids (water and electrolyte) continuously.
- At all times follow the instructions of the SSHO or designee.
- Do not deviate from the APP or the instruction of the SSHO.
- Avoid rushing and/or taking short cuts.
- Handle and dispose all waste generated from decontamination procedures per contract requirements.



- Conduct visual checks on machinery and equipment prior to use and complete the daily inspection form.
- Take precautions to prevent spillage and splashing; contain spilled liquid if possible.
- Alert your senses to potentially dangerous situations (e.g., strong, irritating, or nauseating odors).
- Familiarize yourself with the physical characteristics of the site.
- Dispose of all wastes generated during activities as directed by the Supervisor, SSHO or designee.

Conformance with these site rules is mandatory for continued project participation.

10.2 Work Permit Requirements

Excavation/digging permits: Where required, EFS will obtain a dig permit from the authority having jurisdiction (AHJ). The AHJ for this location is UDIG-NY. The dig permit will be renewed prior to expiration with the applicable 811 (utility locating) agency. Work will stay within the parameters on the permit. If excavation is extended in terms of area or time, a new/revised permit will be obtained. Work will be conducted in accordance with ECC SOPs for excavation.

Hot work permits: A permit will be obtained from the authority having jurisdiction for welding, cutting, grinding, temporary heating devices or any other activity involving sparks or open flames. In addition, the EFS Supervisor or SSHO will issue a daily hot work permit in accordance with ECC EHS SOP-04-02.

Confined Space Entry permits: A permit will be obtained from the SSHO or other qualified Entry Supervisor in accordance with ECC EHS SOP-04-01 and the site specific Confined Space Entry Plan, attached to the APP, if required.

Line Breaking permits: When first opening a chemical process line, or one containing other hazards such as pressure or high temperature fluids, a line breaking permit will be completed in accordance with ECC, EM 385-1-1 and OSHA requirements.

Control of Hazardous Energy permits: Where equipment or systems must be de-energized to safely work on them and a specific written procedure does not exist for the equipment, a Lockout/Tagout permit will be completed in accordance with ECC EHS SOP-04-03.

10.3 Material Handling Procedures

Procedures specific to materials handling will be detailed in the associated AHA.

10.4 Drum/Container/Tank Handling Procedures

Drums and containers are not anticipated to be utilized on this project. In the event it becomes necessary to use drums, an AHA will be developed to safely handle drums. If buried drums are found, work will stop immediately and the client will be notified immediately.



10.5 Comprehensive AHA of Treatment Technologies

This is not anticipated to be a requirement on this project.

11.0 CONTAMINATION CONTROL, SANITATION AND WASTE MANAGEMENT

The following sections describe the basic contamination control during the field activities. A Contamination Control Plan is provided in Appendix I of the Accident Prevention Plan.

11.1 Personal Hygiene and Decontamination Procedures

Wash stations equipped with potable water will be established on the work site. Reference the Contamination Control Plan for more detailed information. Workers will don and doff PPE (Tyvek suits, rubber booties) at the Radiological Control Point.

11.2 Equipment Decontamination Procedures

Equipment will be decontaminated in accordance with ECC SOP ENV SOP 01.09 and SOP 02-16. Equipment will consist of dry decontamination procedures including removal of visible soils, ingoing outgoing radiation surveys, and stone road surface. Reference the Radiation Protection Plan for further information.

11.3 Engineering and Special Work Practices

No special or non-routine engineering or work practices are anticipated to be necessary during this project. A dedicated break trailer will be provided. Employees will move from zone to zone by going through decontamination procedures as required. Pickup trucks and UTVs will not enter contaminated areas.

11.4 Materials Management

Materials will be stored in accordance with applicable storage requirements as discussed in the Site Operations Plan.

12.0 EMERGENCY PLANNING

Refer to APP Section 8.2.

13.0 PRE-ENTRY BRIEFING

As discussed in Section 5 of the APP, all personnel entering the site will be provided with site-orientation training and must be present at the daily tailgate meeting.

14.0 EFFECTIVENESS OF PLAN

The effectiveness of this SSHP will be determined by the inspections listed in Section 6 of the APP, as well as from incident investigations and input by site personnel including reports of hazards, safety observations and suggestions for improvement.



15.0 REFERENCES

American Conference of Governmental Industrial Hygienists, current, *Threshold Limit Values and Biological Exposure Indices*, Cincinnati, Ohio.

American National Standards Institute, <<http://www.ansi.org/>>.

Code of Federal Regulations, Title 29, §1910, *Safety and Health Regulations for General Industry*, U.S. Government Printing Office, Washington, D.C.

Code of Federal Regulations, Title 29, §1926, *Safety and Health Regulations for Construction*, U.S. Government Printing Office, Washington, D.C.

National Institute for Occupational Safety and Health, *NIOSH Pocket Guide to Chemical Hazards*, current revision, Government Printing Office, Washington, D.C.

National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, U.S. Coast Guard, and U.S. Environmental Protection Agency (NIOSH et al.), 1985, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH Publication No. 85-115, Cincinnati, Ohio, October.


U.S. Army Corps of Engineers (USACE), 2014, Engineer Manual 385-1-1, *Safety and Health Requirements Manual*, Washington, D.C.

Appendix G
APP Checklist

This page intentionally left blank.

Form A-02
U.S. Army Corps of Engineers
Accident Prevention Plan Checklist

Date of Inspection
3/21/2024

Location (Plant or Facility) Former Harshaw Chemical Company	Contract Number W912P424C0002
Contractor Name Enviro-Fix Solutions	Project Name Former Harshaw Chemical Site, R
Inspector Name (Print) Kym Edelman	Inspector Signature 

This checklist serves as a guide only, it does not replace or eliminate the need to comply with the requirements set forth in Engineering Manual 385-1-1, Safety and Health Requirements Manual, dated 30 Nov 2014. The references included in this checklist correspond to the applicable sections of EM 385-1-1.

Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)
a. Signature sheet				
1. Includes the name, title, signature, telephone number, and qualifications of the Plan Preparer (<i>Qualified person, i.e. corporate safety staff person, QC</i>)	<input checked="" type="checkbox"/>			
2. Includes the name, title, signature, telephone number, and qualifications of the Plan Approver (<i>e.g. owner, company president, regional vice president</i>) (HTRW activities require approval of a Certified Industrial Hygienist, a Certified Safety Professional may approve the plan for operations involving UST removal where contaminants are known to be petroleum, oils, or lubricants).	<input checked="" type="checkbox"/>			
3. Includes the name(s), title(s), signature(s), telephone number(s), and qualifications for Plan Concurrence (provide concurrence of other applicable corporate and project personnel (contractor)) (<i>e.g. Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional, project QC.</i>)	<input checked="" type="checkbox"/>			
b. Background information				
1. Includes the Contractor Name.	<input checked="" type="checkbox"/>			
2. Includes the Contract Number.	<input checked="" type="checkbox"/>			
3. Includes the Project Name.	<input checked="" type="checkbox"/>			
4a. Includes the Brief Project Description.	<input checked="" type="checkbox"/>			
4b. Includes a Discription of the Work to be Performed.	<input checked="" type="checkbox"/>			
4c. Includes the Location of the Project (map).	<input checked="" type="checkbox"/>			
4d. Includes the Equipment to be Used.	<input checked="" type="checkbox"/>			
4e. Includes the Anticipated High Risk Activities.	<input checked="" type="checkbox"/>			
5. Includes the Major Phases of Work Anticipated. <i>(Within these major phases of work identified, activities [includes Definable features of Work (DFOWs) and tasks] to be performed that will require an AHA shall be specifically highlighted. This information can then be used by QC, QA and Safety personnel to track AHA submittals. The AHAs for these activities, tasks of DFOWs are NOT submitted at this time (AHAs created/submitted at this time would not be activity-specific as they are intended to be). > See Sections 01.A.14 and 01.A.15.)</i>	<input checked="" type="checkbox"/>			

Form A-02 U.S. Army Corps of Engineers Accident Prevention Plan Checklist (cont'd)				Date of Inspection 3/21/2024	
Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)	
c. Statement of Safety and Health Policy.					
1. Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. <i>(In addition to the corporate policy statement, a copy of the corporate safety program may provide a portion of the information required by the accident prevention plan.)</i>	✓				
2. Includes Contractor's written safety program goals.	✓				
3. Includes Contractor's written safety program objectives.	✓				
4. Includes the Contractor Accident Experience <i>(Copy of OSHA 300 Forms, or equivalent documentation)</i> .	✓				
d. Responsibilities and Lines of Authority.					
1. Includes statement of the employer's ultimate responsibility for the implementation of his SOH program for his own employees, all sub-contractors and all others on the worksite (includes the strict enforcement of the program).	✓				
2. Includes the identification and accountability of personnel responsible for safety and health at both the corporate and project level – including their resumes. Qualifications shall be in accordance with Section 01.A.17. <i>(Only official OSHA 30-Hour cards will be accepted or, if equivalent training is provided, appropriate instructor qualifications.)</i>	✓				
3. Includes equivalent training to the OSHA 30-Hour classes is being presented as qualification, the training shall cover, as a minimum, the areas discussed in Appendix A, Section 3.d.3.(a-d).			✓	all have 30-hour	
4. Includes the names of Competent (CP) and/or Qualified Person(s) (QP) and proof of competency/qualification to meet specific OSHA CP/QP requirements. <i>(Must include copies of proof of CP/QP)</i> .	✓				
5. Includes requirements and details of the employer's Risk Management Process. <i>(USACE uses the Activity Hazard Analysis (AHA) as part of a total risk management process. Contractors and other individual employer's may use the AHAs or their own version [Job Safety Analyses (JSAs), Job Hazard Analyses (JHAs), or similar Risk Management assessment tools]. These documents are considered equivalent to, and acceptable substitutes for, the USACE's AHA provided the data collected is the same as that required by the AHA.)</i>	✓				
6. Includes requirements for initial activity-specific AHAs to be submitted and accepted at preparatory meetings, prior to work being performed;	✓				
7. Includes requirements that no work by the Contractor shall be performed unless a designated Competent Person/SSHO is present on the job site.	✓				
8. Includes policies and procedures regarding non-compliance with safety requirements (to include disciplinary actions for violation of safety requirements).	✓				
9. Lines of authority.	✓				
10. Includes written company procedures for holding managers and supervisors accountable for safety.	✓				

Form A-02 U.S. Army Corps of Engineers Accident Prevention Plan Checklist (cont'd)				Date of Inspection 3/21/2024	
Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)	
e. Subcontractors and Suppliers.					
1. Includes the list of subcontractors and suppliers. <i>(If not known at the time of initial APP submittal, the contractor shall include the following statement in their initial APP: "The subcontractors for the following DFOWs/activities are not known at this time, but additional information will be submitted to the APP for acceptance prior to the start of any activities listed")</i>	✓				
2. Includes safety responsibilities of subcontractors and suppliers.	✓				
f. Training					
1. Includes requirements for new hire SOH orientation training at the time of initial hire of each new employee.	✓				
2. Includes requirements for mandatory training and certifications that are applicable to this project (e.g., <i>explosive actuated tools, confined space entry, crane operator, diver, vehicle operator, HAZWOPER training and certification, PPE</i>) and any requirements for periodic retraining / recertification.	✓				
3. Includes procedures for periodic safety and health training for supervisors and employees.	✓				
4. Includes the requirements for emergency response training.	✓				
g. Safety and Health Inspections					
1. Includes specific assignment of responsibilities for a minimum daily jobsite SOH inspection during periods of work activity.	✓				
1a. Includes the name(s) of individual(s) responsible for conducting safety inspections. (e.g., <i>PM, safety professional, QC, supervisors, employees</i>)	✓				
1b. Includes proof of inspector's training / qualifications.	✓				
1c. Indicates when inspections will be conducted.	✓				
1d. Indicates procedures for documentation. (<i>Furnished sample forms upon which inspections will be recorded.</i>)	✓				
1e. Indicates deficiency tracking system and follow-up procedures.	✓				
2. Includes any external inspections / certifications which may be required. (e.g., <i>US Coast Guard</i>)	✓				
h. Mishap Reporting and Investigation					
1. The plan identifies how, when, and who shall complete the Exposure data (man-hours worked).	✓				
2a. The plan identifies how, when, and who shall complete mishap investigations, reports, and logs. (<i>The contractor shall report, thoroughly investigate, and analyze all mishaps occurring incidentally to an operation, project or facility for which this manual is applicable.</i>)	✓				
2b. The plan identifies how, when, and who shall make immediate notification of major mishaps. (<i>Mishaps shall be reported as soon as possible but not more than 24 hours afterwards to the KO/COR.</i>)	✓				
2c. Includes how, when, and who will provide notice to the KO/COR when corrective actions are completed. (<i>Implement corrective actions as soon as reasonably possible.</i>)	✓				

<div>Form A-02</div> <div>U.S. Army Corps of Engineers</div> <div>Accident Prevention Plan Checklist (cont'd)</div>				<div>Date of Inspection</div> <div>3/21/2024</div>	
<p>Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable safety and occupational health risks and associated compliance plans. Using the EM 385-1-1 as a guide, plans, <u>programs</u>, <u>procedures</u> (assessments and evaluations), may include but not be limited to:</p> <p><u>(1) Include a project-specific compliance plan, as applicable to the work being performed, and as identified below. The plans shall incorporate project-wide procedures to control hazards to which the employees of all project employers may be exposed.</u></p> <p><u>(2) These procedures shall be coordinated with all project employers and shall include project-specific, project-wide emergency response and evacuation procedures, PPE requirements, recordkeeping and reporting requirements, and training requirements.</u></p> <p><u>(3) The plans shall be prepared prior to the start of any work activities on the job site (as much as the information can be known at that point in time). The plans shall be updated throughout the life of the project to include changes in personnel, equipment, conditions, etc. Additional revisions shall be incorporated as necessary to reflect changing site conditions, construction methods, personnel roles and responsibilities and construction schedules.</u></p> <p><u>(4) No activity (DFOW) shall be started on site until the APP is revised and submitted to the GDA for acceptance, with the site-specific plans, programs and procedures required to complete the project.</u></p>					
Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)	
i. Plans (Programs, Procedures, Assessments, and Evaluations) required by the Safety Manual					
1. <u>Fatigue Management Plan</u> (01.A.20)	✓				
2. Emergency Plans (01.E):	✓				
(a) Procedures & Test (01.E.01)	✓				
(b) Spill Plans (01.E.01, 06.A.02)	✓				
(c) Fire Fighting Plan (01.E.01; 19.A)	✓				
(d) Posting of Emergency Telephone Numbers (01.E.05)	✓				
(e) Man overboard/abandon ship (19.A.04)			✓	no work from marine vessels	
(f) Plan for prevention of alcohol and drug abuse (01.C.02 & Specs)	✓				
3. <u>Site Sanitation/Housekeeping Plan</u> (02.B)	✓				
4. <u>Medical Support Agreement</u> . Outline on-site medical support and off-site medical arrangements including rescue and medical duties for those employees who are to perform them, and the name(s) of on-site Contractor personnel trained in first aid and CPR. A minimum of two employees shall be certified in CPR and first-aid per shift/site (03.A.01, 03.A.03)	✓				
5. <u>Blood-borne Pathogen Program</u> (03.A.05)	✓				
6. <u>Exposure Control Plan</u> (03.A.05)	✓				
7. <u>Automatic External Defibrillator (AED) Program</u> (03.B.04)			✓	no AED on site	
8. <u>Site Layout Plan</u> (04.A)	✓				
9. <u>Access/Haul Road Plan</u> (04.B)	✓				
10. <u>Hearing Conservation Program</u> (05.C)	✓				
11. <u>Respiratory Protection Plan</u> (05.G)	✓				
12. <u>Health Hazard Control Program</u> (06.A)	✓				
13. <u>Hazard Communication Program</u> (06.B.01)	✓				
14. <u>Process Safety Management Plan</u> (06.B.04)			✓		
15. <u>Lead Compliance Plan</u> (06.C.02 & Specifications)			✓		
16. <u>Asbestos Abatement Plan</u> (06.C.03 & Specifications)			✓		

Form A-02 U.S. Army Corps of Engineers Accident Prevention Plan Checklist (cont'd)				Date of Inspection 3/21/2024
<i>Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks and compliance plans. Using the EM 385-1-1 as a guide, plans, <u>programs, procedures (assessments and evaluations)</u>, may include but not be limited to:</i>				
Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)
i. Plans (Programs, Procedures) continued.				
17. Radiation Safety Program (06.F)	✓			
18. Abrasive Blasting Plan (06.I)			✓	
19. Heat Stress Monitoring Plan (HSMP) (06.J.02)	✓			
20. Cold Stress Monitoring Plan (CSMP) (06.J.04)	✓			
21. Indoor Air Quality Management Plan (06.L)			✓	
22. Mold Remediation Plan (06.L.04)			✓	
23. Chromium (VI) Exposure Evaluation (06.M)	✓			
24. Crystalline Silica Assessment (06.N.02)	✓			
25. Lighting Plan for Night Operations (07.A.06)			✓	
26. Traffic Control Plan (08.C.05)			✓	
27. Fire Prevention Plan (09.A.01)	✓			
28. Wild Land Fire Management Plan (09.L)			✓	
29. Arc Flash Hazard Analysis (11.B)			✓	
30. Assured Equipment Grounding Control Program (AEGCP), (11.D.05, Appendix E)			✓	
31. Hazardous Energy Control Program and Procedures (12.A.01)	✓			
32. Standard Pre-Lift Plan – LHE (16.A.03)	✓			
33. Critical Lift Plan – LHE (16.H)			✓	
34. Naval Architectural Analysis – LHE (Floating) (16.L)			✓	
35. Floating Plant Inspection and Certification (19.A.01)			✓	
36. Severe Weather Plan for Marine Activities (19.A.03)			✓	
37. Emergency Plan for Marine Activities (19.A.04)			✓	
38. Man Overboard/Abandon Ship Procedures (19.A.04)			✓	
39. Float Plan for Launches, Motorboats, Skiffs (19.F.04)			✓	
40. Fall Protection and Prevention Plan (21.D)	✓			
41. Demolition/Renovation Plan (to include engineering survey) (23.A)			✓	
42. Rope Access Work Plan (24.H)			✓	
43. Excavation/Trenching Plan (25.A.01)	✓			
44. Fire Prevention and Protection Plan for Underground Construction (26.D.01)			✓	
45. Compressed Air Work Plan for Underground Construction (26.I.01)			✓	
46. Erection and Removal Plan for Formwork and Shoring (27.C)			✓	
47. Precast Concrete Plan (27.D)			✓	

Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks and compliance plans. Using the EM 385-1-1 as a guide, plans, programs, procedures (assessments and evaluations), may include but not be limited to:

Item Description	Yes	No	N/A	Remarks (Any NO or N/A item)
i. Plans (Programs, Procedures) continued.				
48. Lift-slab Plans (27.E)			✓	
49. Masonry Bracing Plan (27.F.01)			✓	
50. Steel Erection Plan (28.B)			✓	
51. Explosives Safety Site Plan (ESSP) (29.A)			✓	
52. Blasting Plan (29.A; 26.J)			✓	
53. Dive Operations Plan (30.A.14, 30.A.16)			✓	
54. Safe Practices Manual for Diving Activities (30.A.15)			✓	
55. Emergency Management Plan for Diving (30.A.18)			✓	
56. Tree Felling/Maintenance Program (31.A.01)			✓	
57. Aircraft/Airfield Construction Safety & Phasing Plan (CSPP) (32.A.02)			✓	
58. Aircraft/Airfield Safety Plan Compliance Document (SPCD) (32.A.02)			✓	
59. Site Safety and Health Plan (HTRW) (33.B)	✓			
60. Confined Space Entry Procedures (34.A.05)	✓			
61. Confined Space Program (34.A.06)	✓			
j. Risk Management Processes (AHAs). Detailed project-specific hazards and controls shall be provided by Activity Hazard Analysis for each activity (DFOW). No work will begin on an activity (DFOW) until the initial AHA has been accepted by the GDA addressing the project-specific hazards. (01.A.14 & 01.A.15) <i>Note: USACE uses the Activity Hazard Analysis (AHA) as part of a total risk management process. Contractors and other individual employer's may use the AHAs or their own version [Job Safety Analyses (JSAs), Job Hazard Analyses (JHAs), or similar Risk Management assessment tools]. These documents are considered equivalent to, and acceptable substitutes for, the USACE's AHA provided the data collected is the same as that required by the AHA.</i>	✓			

Remarks:

<div><div>Form A-02</div><div>U.S. Army Corps of Engineers</div><div>Accident Prevention Plan Checklist (cont'd)</div></div>	<div>Date of Inspection</div> <div>3/21/2024</div>
<div>Other Remarks:</div>	

Appendix H
Radiation Protection Plan

This page intentionally left blank.

FINAL RADIATION PROTECTION PLAN

Remediation of Operable Units 1 and 2 – Former Harshaw Chemical Company Site, Cleveland, Ohio

Contract No. W912P424C0002

Delivery Order No. W912P423R0019

April 29, 2024

Prepared for:



USACE Buffalo District

478 Main Street
Buffalo, New York 14202

Prepared by:



Enviro-Fix Solutions LLC

1240 Bayshore Highway, Suite 311
Burlingame, California 94010
Phone: 650-347-1555 / Fax: 650-347-8789

This page intentionally left blank.



TABLE OF CONTENTS

LIST OF TABLES	III
ACRONYMS	IV
1.0 INTRODUCTION.....	1-1
2.0 SCOPE OF THE RADIATION PROTECTION PLAN	2-1
3.0 REGULATORY REQUIREMENTS	3-1
4.0 RESPONSIBILITIES AND AUTHORITIES	4-1
4.1 Radiation Safety Officer (RSO).....	4-1
4.2 Radiation Protection Supervisor (RPS)	4-1
4.3 Radiation Protection Technicians (RPTs).....	4-1
5.0 RADIONUCLIDES OF CONCERN.....	5-1
5.1 Uranium	5-2
5.2 Radium.....	5-2
5.3 Thorium.....	5-2
6.0 OCCUPATIONAL RADIATION EXPOSURE LIMITS	6-1
6.1 Adult Employees.....	6-1
6.2 Embryo/Fetus.....	6-1
6.3 Radiation Exposure to Minors	6-2
6.4 Exposure to Visitors and Members of the Public	6-2
6.5 ALARA Provision	6-2
7.0 SURVEYS AND AIR MONITORING	7-1
7.1 Radiation Surveys	7-1
7.2 Contamination Surveys.....	7-2
7.3 Radiological Air Monitoring.....	7-4
7.4 Air Sample Analyses.....	7-6
7.5 Operational Action Levels	7-6
8.0 BIOASSAYS AND TLD BADGES	8-1
9.0 TRAINING	9-1
10.0 WORK SUPPORT ACTIVITIES	10-1
10.1 Access Control.....	10-1
10.2 Radiation Work Permits.....	10-1
10.3 Engineering Controls	10-1
10.4 Posting Requirements	10-2
10.5 Control of Radioactive Materials.....	10-2
10.6 Storage and Inventory	10-2
10.7 Decontamination	10-3
10.7.1 Personnel Decontamination	10-4
10.7.2 Equipment Decontamination	10-4
10.8 Instrumentation	10-4
11.0 RADIOACTIVE MATERIAL SPILLS.....	11-1



11.1	Material Spills	11-1
11.1.1	Notifications.....	11-1
11.1.2	Spill Response Equipment	11-1
12.0	RECORDS MANAGEMENT	12-1
12.1	Administrative Records	12-1
12.2	Monitoring and Workplace Records	12-1
12.3	Dosimetry Reports	12-2
12.4	Reports to Individuals	12-2
12.5	Reports to Employers (Non-EFS).....	12-2
13.0	RADIATION PROTECTION PROCEDURES.....	13-1



LIST OF TABLES

Table 5-1	Site Cleanup Goals
Table 6-1	Occupational Radiation Exposure Limits (10 CFR 20)
Table 6-2	ACL and ALARA Goal Values
Table 7-1	Radiological Contamination Limits for Free Release
Table 7-2	Operational Action Levels
Table 13-1	Radiation Protection Standard Operating Procedures

LIST OF APPENDICES

Appendix A	Radiation Protection Standard Operating Procedures
-------------------	--



ACRONYMS

ACL	Administrative Control Limit
ALARA	As Low as Reasonably Achievable
ALI	annual limit for intake
ANSI	American National Standards Institute
APP	Accident Prevention Plan
BZ	Breathing Zone
CEDE	Committed Effective Dose Equivalent
CDE	Committed Dose Equivalent
CFM	cubic feet per minute
CFR	Code of Federal Regulations
cpm	counts per minute
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration
DAC-hrs	Derived Air Concentration Hours
DCGL	Derived Concentration Guideline Level
DDE	Deep Dose Equivalent
dpm	disintegrations per minute
EFS	Enviro-Fix Solutions LLC
EM	Engineering Manual
ER	Engineer Regulation
EZ	Exclusion Zone
FUSRAP	Formerly Utilized Sites Remedial Action Program
GA	General Area
HCCS	Harshaw Chemical Company Site
LAW	Large Area Wipe
LDE	Lens of Eye Dose Equivalent
lpm	liters per minute
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	Minimum Detectable Activity
MDC	Minimum Detectable Concentration
mrem/yr	millirem per year
NESHAP	National Emission Standards for Hazardous Air Pollutants
NCRP	National Council on Radiation Protection
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OH	Ohio
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
Pb	lead
PM	Project Manager
PPE	Personal Protective Equipment
QC	Quality Control




Ra	Radium
rem	Roentgen Equivalent Man
RESRAD	Residual Radioactivity computer code
Rn	radon
ROC	Radionuclide of Concern
RP	Radiation Protection
RPP	Radiation Protection Plan
RPS	Radiation Protection Supervisor
RPT	Radiation Protection Technician
RSO	Radiation Safety Officer
RWP	Radiation Work Permit
RWT	Radiation Worker Training
SAF	Self-Absorption Fraction
SDE	Shallow Dose Equivalent
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TEDE	Total Effective Dose Equivalent
Th	Thorium
TODE	Total Organ Dose Equivalent
U	Uranium
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WWTS	waste water treatment system


**SIGNATURES**

This Final Radiation Protection Plan (RPP) has been prepared by Enviro-Fix Solutions, LLC (EFS) to describe the radiological controls requirements for the former Harshaw Chemical Company Site Remediation of Operable Unit 1 and Operable Unit 2, Cleveland, Ohio (OH) Project. Work conducted under this contract will be performed in accordance with applicable federal, state, and local safety and occupational health laws and regulations including Occupational Safety and Health Administration (OSHA) standards, including 29 Code of Federal Regulations (CFR) 1910 and 1926, and the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, 15 November 2014). The contents of this RPP are subject to review and revision as new information becomes available.

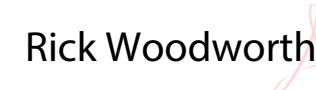
Plan Preparer:

	6/3/2024	865-251-2075
Eric Laning Vice President of Health Physics Services	Date	Phone

Plan Approver:

	6/3/2024	201-965-9099
Scott Walnicki, CHP Health Physicist	Date	Phone

Plan Concurrence:

 Digitally signed by Rick Woodworth Date: 2024.06.03 10:12:40 -04'00'	6/3/2024	215-776-0629
Rick Woodworth Sr. Project Manager	Date	Phone



1.0 INTRODUCTION

EFS has prepared this plan for the United States Army Corps of Engineers (USACE) – Buffalo District under Contract Number W912P424C0002, Delivery order No. W912P423R0019 to conduct remedial activities at the former Harshaw Chemical Company Site (HCCS) located at 1000 Harvard Avenue in Cleveland, Ohio (OH). The HCCS is included in the government's Formerly Utilized Sites Remedial Action Program (FUSRAP). The planned remedial activities include removal and off-site disposal of radiological and/or chemical contaminated soil and debris (pavement and foundations). Radiologically impacted groundwater, stormwater, and construction water will be processed onsite in the wastewater treatment system (WWTS) to manage radionuclides.

This Final Radiation Protection Plan (RPP) presents requirements that EFS personnel and subcontractors will follow in performing work activities at the HCCS. Applicability extends to EFS personnel, EFS's subcontractors, and visitors inclusive of USACE personnel and representatives, engineers and subcontractors. Personnel supervised by organizations other than EFS must adhere to an approved radiation protection (RP) program prepared and administered by that organization.

This page intentionally left blank.



2.0 SCOPE OF THE RADIATION PROTECTION PLAN

The scope of this RPP is specific to the remedial activities planned for the HCCS Remediation of Operable Units (OU) 1 and 2. All work performed within the fence line of the OU1 and OU2 boundary is within the scope of this RPP.

Radiation and radioactive materials are defined as workplace and environmental hazards. Worker protection requirements for exposure to radiation and/or radioactive materials are defined in federal regulations and are maintained through the implementation of this RPP.

This RPP defines the worker protection requirements for radiation exposure control as a support document to the Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP). This plan provides the template for lower tier procedures developed and implemented as project RP Standard Operating Procedures (SOPs) that are commensurate with the scope and extent of the radiation hazards associated with remediation activities and are sufficient to ensure compliance with the applicable regulatory requirements. This RPP outlines the functions and responsibilities of the RP personnel and describes the activities to be performed at HCCS. A list of applicable RP procedures is provided in **Table 13-1**.

This page intentionally left blank.



3.0 REGULATORY REQUIREMENTS

This RPP has been developed and the field activities described herein will be performed in accordance with the following documents:

- U.S. Army Corps of Engineers (USACE) Engineer Manual (EM) 385-1-1, *Safety and Health Requirements Manual*, (USACE, 2014).
- USACE ER 385-1-92, *Safety and Occupational Health Requirements for Environmental Cleanup Projects*, (USACE, 2000).
- USACE EM 385-1-80, *Radiation Protection Manual*, (USACE 2013).
- USACE Engineer Regulation (ER) 385-1-80, *Ionizing Radiation Protection*, (USACE 2010).
- US Department of Labor, Occupational Safety and Health Administration (OSHA), Chapter 29, Sections 1910.120 and 1926 of the Code of Federal Regulations (29 CFR 1910.120 and 1926).
- USEPA, National Emission Standards for Hazardous Air Pollutants (40 CFR 61).

This page intentionally left blank.



4.0 RESPONSIBILITIES AND AUTHORITIES

4.1 Radiation Safety Officer (RSO)

The RSO will be responsible for the implementation of this RPP. The RSO will:

- Have oversight of all RP activities and operations relating to radioactive sampling, radioactive sample analysis, site radioactive surveys, handling and packaging of radioactive materials, waste management, and associated operations,
- Assure that environmental monitoring addresses the site-specific emissions providing clear and accurate documentation of compliance, and that all personnel are adequately trained in RP principles commensurate to the level with each person's job function,
- Correct any work practices and/or conditions that may result in unnecessary exposure to radioactive materials,
- Lead the regulatory interface for all matters of RP and/or radioactive waste management,
- Be involved in the project work planning of all operations in contaminated areas,
- Consult with the Site Safety and Health Officer (SSHO) about any deficiencies involving project radiation safety matters.

4.2 Radiation Protection Supervisor (RPS)

The RPS reports to the RSO and provides field supervision of Radiation Protection Technicians (RPTs). The RPS will:

- Provide supervision and guidance to RP Staff,
- Communicates daily task assignments,
- Provides RP related input during daily plan-of day meetings,
- Performs quality control (QC) reviews of all radiological survey documentation,
- Develops Radiation Work Permits (RWPs).

4.3 Radiation Protection Technicians (RPTs)

RPTs will report to the RPS. The RPTs will:

- Perform all routine radiation, contamination, and airborne monitoring surveys,
- Implements requirements of RWPs,
- Control the access of tools, personnel and equipment into and out of the Exclusion Zone (EZ), including surveys for unconditional release,
- Performs RP briefing of personnel and ensure implementation requirements,
- Perform QC checks and operability checks of the instrumentation used,
- Perform any personnel decontamination as needed,
- Maintain and post all radiological areas with applicable signs and barriers.

This page intentionally left blank.



5.0 RADIONUCLIDES OF CONCERN

There are four radionuclides of concern (ROCs) identified in the soil including radium-226 (Ra-226), thorium-230 (Th-230), thorium-232 (Th-232), and total uranium (U). Uranium-238 (U-238) has been used as a surrogate for total U. For each ROC, site cleanup goals have been identified and are specific to each OU.

Table 5-1. Site Cleanup Goals^{a,b}

COC	OU-1 (pCi/g)	OU-2 (pCi/g)	Mean Background (pCi/g)
Ra-226 ^c	9.1	3.6	0.941
Th-230	35	16	0.878
Th-232 ^d	6	3.6	0.981
U-238 ^e	190	150	1.27

Notes:

- All values represent minimum RESidual RADiation (RESRAD) Computer Code calculated Derived Concentration Guideline Levels (DCGLs) at years 0, 185, or 1,000 (i.e., year of peak dose per nuclide group).
- Groundwater was not considered a drinking water source during development of the cleanup goals. They are based on a dose of 25 millirem per year (mrem/yr) Total Effective Dose Equivalent (TEDE) for each radionuclide.
- DCGL includes lead (Pb)-210 contribution to the dose at time 0.
- DCGL includes Ra-228 and Th-228 contribution to the dose at time 0.
- U-238 is not an ROC, although the DCGL for U-238 will be used as a surrogate for total U during the remedial action.

Remediation activities will require the implementation of radiological controls throughout the entire project. The use of personal protective equipment (PPE), as low as reasonably achievable (ALARA) controls, controlled waste handling practices, and other various radiological control applications will be instituted during the project to minimize personnel radiation exposure, reduce the potential risk of personnel contamination, and prevent the spread of contamination to uncontrolled areas.

The primary concern during most aspects of this project is the inhalation and/or ingestion of radioactive dust particles. To protect workers from this potential, respiratory protection will be utilized for operations that have a potential for generating air contaminants in excess of allowable exposure limits. Skin contamination is also considered a primary concern. To protect workers from this potential, PPE will be utilized when handling or coming into contact with radioactive materials, or entry into any areas controlled for surface contamination. Workers will wear specified appropriate protective equipment for protection against dermal contact with radioactive loose surface contaminants. Deliberate ingestion and inhalation of contaminants is highly unlikely;



however, work habits and contamination area controls will be taken seriously and given the utmost attention in order to reduce the potential for inadvertent skin contamination and or ingestion/inhalation during work tasks not requiring respiratory protection. Additionally, no eating, drinking, smoking, or chewing will be allowed inside of the EZ, Contamination Reduction Zone (CRZ), or any radiologically posted areas.

5.1 Uranium

Uranium is a radioactive metal. Toxicological effects from the ingestion of uranium result from both the action of uranium as a metal and its radioactive properties. The primary toxic chemical effect of uranium is seen in kidney damage. In addition, case studies have shown that the inhalation of uranium dust may cause an increase in lung cancer incidents, which may be attributable to the decay of uranium into radon (Rn-222) and its daughters.

5.2 Radium

Radium is a naturally occurring radioactive element that exists in several isotopes, which are formed from the decay of uranium and thorium. Ra-226, which is a decay product of U-238, is an alpha and gamma emitter and has the longest half-life of the radium isotopes.

Radon is a decay product of Ra-226. A colorless, odorless, radioactive gas, radon can infiltrate basements and water systems, resulting in exposure via inhalation pathways.

5.3 Thorium

Thorium is a naturally occurring, radioactive element that exists in several isotopic forms. The isotope Th-232 is a naturally occurring, radioactive element, which decays through the emission of a series of alpha and beta particles and the formation of daughter products. Isotopes Th-234 and Th-230 are produced during the decay of naturally occurring U-238; the isotope Th-228 during the decay of Th-232; and the isotopes Th-231 and Th-227 during the decay of U-235.



6.0 OCCUPATIONAL RADIATION EXPOSURE LIMITS

Occupational Radiation Exposure Limits are established in 10 CFR 20 *Standards for Protection Against Radiation* and promulgated in EM-385-1-80 *Radiation Protection Manual* of the USACE.

The radiation exposure to HCCS personnel accessing radiological areas shall be controlled to ensure that the limits shown in **Table 6-1** are not exceeded. These limits are consistent with federal regulations that are applicable to HCCS work activities involving exposure or potential exposure to radiation and/or radioactive materials and are the maximum allowed, with approval of the EFS RSO.

6.1 Adult Employees

Table 6-1. Occupational Radiation Exposure Limits (10 CFR 20)

Total Effective Dose Equivalent (TEDE)	(TEDE = DDE + CEDE)	5.0 rem/yr
Total Organ Dose Equivalent (TODE) to Maximum Exposed Organ	(TODE = DDE + CDE)	50.0 rem/yr
Lens of Eye Dose Equivalent (LDE)	(LDE)	15.0 rem/yr
Shallow Dose Equivalent (SDE) to Skin or Extremity	(SDE)	50.0 rem/yr

Where:

- DDE = Deep dose equivalent (i.e., whole body exposure to external penetrating radiation)
- CEDE = Committed effective dose equivalent (e.g., internal exposure from inhalation, ingestion, injury)
- CDE = Committed dose equivalent

6.2 Embryo/Fetus

In the event that a Site worker declares herself pregnant, that worker's task assignments shall be controlled to limit the radiation exposure to the embryo/fetus. That limit shall be based on the time from conception to birth.

Dose equivalent limit to embryo/fetus: 0.5 rem for entire pregnancy



6.3 Radiation Exposure to Minors

The HCCS Project does not employ minor individuals (individuals less than 18 years old) to perform work in a radiation environment.

6.4 Exposure to Visitors and Members of the Public

Members of the public may receive radiation exposure from the HCCS Project controlled and/or monitored activities either as visitors onsite or by occupancy adjacent to the site. A visitor may be a member of the public or may be a representative or employee of a company or agency performing work onsite.

Radiation exposure from all pathways to the public shall be controlled to limit doses to:

$$\text{TEDE} < 0.10 \text{ rem/yr}$$

Radiation exposure from all pathways to visitors onsite or individuals offsite shall be controlled to limit doses to:

$$\text{TEDE} < 0.10 \text{ rem/yr}$$

Additionally, the U.S. Environmental Protection Agency (USEPA) and EM 385-1-80 set an offsite dose limit via air particulate emissions of:

$$0.01 \text{ rem/yr}$$

6.5 ALARA Provision

Work controls for HCCS radiological activities shall be performed in accordance with the requirements of this plan and shall incorporate provisions for reducing radiation exposures to levels that are considered ALARA, including implementation of time, distance, and shielding concepts to limit external radiation exposure. The primary internal radiation exposure pathway of concern for the work at HCCS is through potential inhalation of radioactive particulates. Work controls will include the use of dust suppression and soil surfactants to minimize airborne particulate levels and subsequent exposure of the individual to the radiological environment. Process or other engineering controls are the preferred methods for maintaining exposures to radiation and radioactive materials ALARA.



Additional controls that are evaluated for inclusion into the work control include the following:

- Control of access to radioactive materials,
- Techniques to reduce exposure times,
- Techniques to increase distance between the individual and the source,
- Use of PPE when engineering and administrative controls are ineffective.

Based on the expected radioactivity levels and our team's past experience, radiation exposures to workers are expected to be orders of magnitude below the federal limit. Therefore, we have established site administrative control limits (ACLs) at ten percent (10%) of the federal limit (with the exception of the declared pregnant worker), as well as an ALARA goal for site workers equivalent to 20% of the TEDE ACL, and 10% of the CDE, LDE, and SDE ACL limits, consistent with EM 385-1-80 ALARA goals. The ACL and ALARA goal values (in units of rem/yr) are shown in Error! Reference source not found..

Table 6-2 ACL and ALARA Goal Values

Dose Quantity	10 CFR 20	Site ACL	ALARA Goal
TEDE (rem/yr)	5	0.5	0.1
CDE (rem/yr)	50	5	0.5
LDE (rem/yr)	15	1.5	0.15
SDE (rem/yr)	50	5	0.5
Embryo/Fetus (rem/yr)	0.5	0.5	NA

This page intentionally left blank.



7.0 SURVEYS AND AIR MONITORING

The RPTs will perform radiological survey and air monitoring activities during all aspects of the work at the HCCS. Initial incoming surveys of all equipment and facilities will be performed upon mobilization to confirm baseline radioactivity levels. During operations, routine radiation/contamination surveys will be conducted in and around work areas to document the effectiveness of contamination controls. Gamma walkover surveys will be conducted to support and guide soil excavation activities. CRZs will be surveyed in accordance with an established routine survey schedule to ensure the area is kept free of radioactive contamination. Conditional and unconditional release surveys will be conducted when equipment is either being relocated or demobilized from the Site. Contamination surveys will be conducted of all radiologically posted areas as necessary to track the potential for changing conditions based upon job functions being conducted in the area. Perimeter, General Area (GA), and Breathing Zone (BZ) air monitoring will also be conducted throughout remedial activities, as required by the activity hazards present.

7.1 Radiation Surveys

Radiation/exposure rate surveys give the RP personnel, as well as the worker, an indication of the amount of external occupational radiation exposure per unit time that an individual will receive while performing assigned tasks in a specific area.

Specific exposure rate surveys are needed to determine the disposition of radioactive material or if engineering controls are needed to reduce the exposure to the worker. This particularly applies during entry into areas that have not been previously surveyed and into demolition/excavation areas. Additionally, gamma exposure rate surveys will be performed when radioactive material debris is concentrated into piles or areas for waste storage.

Exposure rate surveys shall be performed in accordance with the RPP implementing procedures. Prior to using a meter, the individual performing the survey shall verify that the meter is in calibration and the batteries are in good working condition and that the meter performance test has been completed.

While performing exposure rate surveys, consideration is given to the types of radiation that are present in the work area so that hazards to personnel in the work area can be identified. Should



any action levels be identified during the survey, the technician will take the appropriate action necessary and perform required notifications. All required dose rate surveys will be documented by the individual performing the survey.

7.2 Contamination Surveys

Radioactive contamination surveys are an important part of the RP Program. Based on results of contamination surveys that are performed in the various work areas, storage areas, and support areas, assessments can determine the appropriate controls to be implemented for radioactive material and to establish RP requirements for personnel working in an area or on equipment.

There are two basic types of radioactive contamination: fixed and removable (smearable or loose surface). Radioactive contaminants are external exposure hazards only as long as the contamination remains fixed. Removable radioactive contaminants represent both external and internal exposure hazards. Routine contamination surveys are primarily conducted to determine smearable levels while special contamination surveys are for smearable and fixed.

Routine contamination surveys are typically performed in conjunction with exposure rate surveys. Contamination surveys are performed using disk smears and/or large area wipes (LAWs). All smear results will be recorded in disintegrations per minute (dpm) per 100 square centimeters (dpm/100 cm²) unless otherwise indicated on the Radiological Survey Form. A drawing/photograph of the survey area or item may be completed by the surveyor if appropriate and attached to the survey form. The individual survey point shall be numbered and the number circled, indicating a smear location on the drawing. Smears will normally be counted on site using a dual channel scaler or proportional counter, however in some instances, "field counting" may be appropriate using a portable hand-held detector. Any detectable activity on the LAW (i.e., Masslinn) will be further investigated and augmented with 100 cm² smears to determine the exact extent of the loose contamination and determine if decontamination of the area, equipment, tool, etc. is necessary.

Care must be taken to avoid damage to the Mylar surfaces of detectors. Scan speed should be no greater than 1/2 probe width per second and, at a distance of 1/2" or less for beta-gamma, 1/4" or less for alpha detection, or as needed to achieve acceptable minimum detectable concentrations from the surface being surveyed. Audible indicators should be used. The total indicated counts per



minute (cpm); minus the background cpm, divided by the detector efficiency, will equal the dpm per smear area.

Contamination surveys will be performed in accordance with SOPs to evaluate radiological conditions and verify that radiological work activities are being adequately controlled. Survey data will be used for the RWP development, job evaluations, environmental reporting, trend analysis, and informing personnel of radiological conditions. Survey results will be made available to workers entering radiologically controlled areas through RWP briefings and daily toolbox meetings.

A variety of survey instruments are routinely used for scanning and frisking, and smear counting. The selected instruments will be used by qualified technicians at proper distances, scan speeds, and count times to ensure that the detection limits of those instruments are less than the acceptable surface contamination levels identified in **Table 7-1**. All instruments will be operated in accordance with the respective technical manuals and SOPs.

It should be understood that scanning minimum detectable activities may vary depending upon background count rate and calibration efficiencies. However, scan speed, background, and count times will be utilized in such a manner that minimum detectable activities for alpha and beta-gamma are kept as low as possible and <75% of the criteria in **Table 7-1** for fixed and loose surface activities.

Table 7-1. Radiological Contamination Limits for Free Release

Radionuclide Groups^{1,2}	Screening Levels³ S.I. Units (Bq/cm² or Bq/g)⁴	Surface Screening Levels³ Conventional Units (dpm/100 cm²)	Volumetric Screening Levels³ Conventional Units (pCi/g)
<u>Group 1</u> Radium, Thorium, and Transuranics: Po-210, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, Np-237, Pu-239, Pu-240, Am-241, Cm-244, and associated decay chains, and others ^{1,5}	0.1	600	3
<u>Group 2</u> Uranium and selected high-dose beta- gamma emitters: Na-22, Mn-54, Co-58, Co-60, Zn-65, Sr-90, Nb-94, Ru-106, Ag-100m, Sb-124, Cs-134, Cs-137, Eu-154, Ir-192, U-234, U-235, U-238, natural uranium, and others ^{1,6}	1	6,000	30
<u>Group 3</u> General beta-gamma emitters: Na-24, Cl-36, Fe-59, Cd-109, I-131, I-129, Ce-144, Au-198, Pu-241, and others ¹	10	60,000	300
<u>Group 4</u> Other beta-gamma emitters:	100	600,000	3,000



Radionuclide Groups^{1,2}	Screening Levels³ S.I. Units (Bq/cm² or Bq/g)⁴	Surface Screening Levels³ Conventional Units (dpm/100 cm²)	Volumetric Screening Levels³ Conventional Units (pCi/g)
H-3, C-14, P-32, S-35, Ca-45, Cr-51, Fe-55, Ni-63, Sr-89, Tc-99, In-111, I-125, Pm-147, and others ¹			

Notes:

1. To determine the specific group for radionuclides not shown, a comparison of the effective dose factors by exposure pathway (see Table A.1 of National Council on Radiation Protection Measurements [NCRP] Report No. 123) shall be performed and a determination of the proper group made based in similarity of the factors.
2. Radionuclides were assigned to groups that were protective of 10 microsieverts per year (1.0 millirem per year) and were limited to four groups for ease of application per Annex B of American National Standards Institute (ANSI) N13.12.
3. Rounded to one significant figure.
4. The screening levels shown are used for either surface activity concentration (Bq/cm²) or volume activity concentration (Bq/g). These groupings were determined based on similarity of the scenario modeling results described in Annex B of ANSI N13.12
5. For decay chains, the screening levels represent the total activity (i.e., activity of the parent plus the activity of all progeny present).
6. Where the natural uranium activity equals 48.9% from U-238, 48.9% from U-234, and 2.25% from U-235.

RP staff will perform routine radiological surveys at a specified frequency consistent with the RPP implementing procedures. The RSO will routinely review surveys with regard to necessity and frequency consistent with good radiological protection practices and regulatory requirements.

The following are surveys that will normally be conducted for this project:

- Daily surveys of active work areas and access/egress points,
- Weekly surveys of offices and break areas,
- Pre-job surveys to support RWP requirements, as necessary,
- Radiological air monitoring of workers and active work areas,
- Perimeter air monitoring,
- Release of material from Restricted Areas,
- Radioactive material shipments,
- Monitoring spills or spread of radioactive material,
- Establishing and verifying radiological controlled area boundaries and postings,
- Monitoring areas and accesses that may have a high potential for change.

7.3 Radiological Air Monitoring

The primary operational RP concern at the site during work activities will be airborne radioactivity generated from remediation operations, etc. An air-sampling program consistent with this RPP and implementing procedures will be implemented to ensure compliance with occupational (derived air concentration [DAC]) and environmental (air effluent) limits. The air-sampling program will



include perimeter, GA and BZ samples. Four perimeter monitoring stations, and one offsite station will be established to confirm effluent airborne radioactivity levels. GA monitors will be located near the work activities most likely to have the highest airborne activity. BZ air samplers will be provided to the person (s) most likely to be exposed in a given work group. The number of breathing zone air samples will depend on the level of airborne activity that is expected to be generated based upon the task being performed.

All air sampling equipment will use dry glass fiber or membrane filter paper as the sampling media. Low-volume air samplers will usually average a draw volume of 1.0 - 4.0 cubic feet per minute (cfm) of air. High-volume air samplers average a typical draw volume of 3.0 – 10.0 cfm of air. The actual volume of each air sampler will be dependent upon model and individualized settings. Personal or lapel air samplers will use a dry glass fiber or membrane filter paper as a sample media and will typically operate at 2-5 liters per minute (lpm).

All air samples taken at the site will be screened for gross alpha/beta-gamma activity. Elevated levels of alpha and/or beta-gamma activity will be cause for the air sample to be shipped to the analytical laboratory for alpha/gamma spectrometry. The radiological contaminant airborne action levels and actions to be taken are listed in **Table 7-2**.

Air sampling may be used to determine, if respirators are needed for a given type of excavation or sampling activity. If respirators are not being used for a given activity, air sample results are reviewed to determine if action levels have been exceeded that would compel the need for respirators. In addition, the air sampling results will be reviewed to determine the need for dust suppression measures.

Perimeter air sampling will be performed at site perimeters to measure airborne particulate concentrations as a result of the excavation and soil handling activities. Air samplers will be in place prior to commencement of intrusive activities at locations specified by the RSO. Four perimeter air sample stations located at the approximate compass cardinal directions will run continually (24/7) during site operations. Additionally, perimeter air samplers will be run for 30 days prior to onsite activities to establish background levels.

Results of the samples will be compared against the air effluent values identified in 10 CFR 20, Appendix B. For the purpose of the onsite screening, all alpha activity will be assumed to be from Th-232, the most restrictive alpha-emitting radionuclide of concern with an effluent limit of 4E-



15 micro-Curies per milliliter ($\mu\text{Ci/ml}$); and a DAC limit of $5\text{E-}13$ $\mu\text{Ci/ml}$. Likewise, for the purposes of onsite screening, all beta activity will be assumed to be from Pb-210, the most restrictive beta emitting radionuclide of concern. Pb-210 has an effluent level of $6\text{E-}13$ $\mu\text{Ci/ml}$ and a DAC of $1\text{E-}10$ $\mu\text{Ci/ml}$.

7.4 Air Sample Analyses

Information required for analysis includes date, counter background, counter efficiency, sample identification and location, time the sample was started and stopped, flow rate, count start time, total count time, and total counts of the counter, and self-absorption factor (SAF). The alpha airborne activity analysis will have a SAF of 0.7^1 (glass fiber) or 1.0 (membrane) applied. This factor will correct for the alpha absorption on the filter and media that are not seen by the detector. No SAF is required for airborne beta analyses. Calculated results will be recorded in microcurie per cubic centimeter ($\mu\text{Ci/cc}$ or $\mu\text{Ci/ml}$, which are equivalent units), unless otherwise indicated.

Samples shall be carefully removed from the packaging to prevent loss of sampled material. Counting a sample consists of placing the filter paper in a planchet and positioning the planchet directly under the counter probe. Counting time will be established to ensure an acceptable minimum detectable activity (MDA). Acceptable MDA is typically 10% of the applicable DAC or air effluent value as established in 10 CFR 20, Appendix B. Field counts may be performed using a count rate meter but must be followed with the standard procedure using a scaler.

7.5 Operational Action Levels

A decision-making protocol for an upgrade in levels of protection and/or withdrawal of personnel from an area based on atmospheric hazards is outlined in **Table 7-2**. The action level values in **Table 7-2** are based on modified 10 CFR 20 limits as discussed in more detail following **Table**

¹ SAF of 0.7 conservatively selected based on a Pacific Northwest National Laboratory study *Assessment of the losses Due to Self Absorption by Mass Loading on Radioactive Particulate Air Stack Sample Filters*, PNNL 2011



7-2; these modifications are summarized as follows:

- Work area action levels are set to 30% of the DAC value to ensure no exposures exceed 12 DAC-hrs per the EM 385-1-1 definition of an airborne radioactivity area,
- Perimeter action levels are set to 20% of the effluent limit to ensure National Emission Standards for Hazardous Air Pollutants (NESHAP) compliance.

Table 7-2. Operational Action Levels

Type of Airborne Radioactivity Measurement	Activity	Action
Total Alpha Particulate-Work Area	1.5E-13 $\mu\text{Ci/ml}$	Stop operations that are presenting the problem until engineering controls can be established that will reduce airborne levels to below this level
Total Alpha Particulate - Perimeter	8E-16 $\mu\text{Ci/ml}$	Stop operations that are presenting the problem, evaluate work tasks in order to reduce airborne levels and reoccurrence
Total Beta Particulate – Work Area	3E-11 $\mu\text{Ci/ml}$	Stop operations that are presenting the problem until engineering controls can be established that will reduce airborne levels to below this level
Total Beta Particulate - Perimeter	1.2E-13 $\mu\text{Ci/ml}$	Stop operations that are presenting the problem, evaluate work tasks in order to reduce airborne levels and reoccurrence

USACE EM 385-1-1 refers to 10 CFR 20, Appendix B for airborne levels. The basis for action is at 1 DAC for any radionuclide. *Airborne Radioactivity area* means a room, enclosure or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations:

- In excess of the DACs specified in Appendix B, to §20.1001 – 20.2401, or
- To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an annual limit intake (ALI) or 12 DAC-hours.

Should airborne levels average 30% of 1 DAC for a 40-hour week and the person was not wearing a respirator, the person could receive 12 DAC-hours. In order to prevent exceeding this requirement, respiratory equipment will be worn during operations that are anticipated to generate airborne radioactivity above the operational action levels (**Table 7-2**), and the work area air



monitoring action level will “flag” potential activity prior to meeting the requirement for tracking DAC-hours and/or the need to post an area as an “*Airborne Contamination Area*.”

The perimeter operational action level is based on 40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAP).

The EPA sets an offsite dose limit of 10 millirem (mrem) per year, as stated in the following excerpt from 40 CFR 61.102:

“Emissions of radionuclides, including iodine, to the ambient air from a facility regulated under this subpart shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.”

Since the 10 CFR 20 Appendix B air effluent values are based on 50 mrem/year, the action level for perimeter air monitor results will be set to 1/5 of the appropriate 10 CFR 20 Appendix B air effluent limits.



8.0 BIOASSAYS AND TLD BADGES

EFS will provide and issue external whole-body dosimeters to all site personnel/vendors/visitors entering radioactive material areas to perform work. Internal exposure will be monitored by general work area and breathing zone air sampling/DAC hour tracking. If an individual exceeds the operational action level of 12 DAC-hours in one week, a urine bioassay will be performed to confirm internal exposure.

Upon completion of all work, when dosimeters have been processed, EFS will send the required U.S. Nuclear Regulatory Commission (NRC) Form to each employee showing a breakdown of their accumulated dose for the work period. A copy of all DAC-hour tracking, bioassay analytical and dosimeter monitoring results shall be provided to USACE and the EFS Project Manager (PM).

All external dosimetry shall be processed by a National Voluntary Laboratory Accreditation Program (NVLAP) certified laboratory.

The RSO may perform radiological assessments to augment the results of routine monitoring when inconsistencies and other incidents occur. For example, lost dosimeters and unexpected airborne contamination events will be investigated and a radiological assessment of potential exposure will be performed and documented. The results of radiological assessments may be used as an exposure record and recorded in an individual's radiation exposure record.

This page intentionally left blank.



9.0 TRAINING

Before any work activity that may expose an individual to sources of radiation, that individual shall be trained to the potential risks associated with the project work activities. This training shall be based on the types of work and work locations that are specific to the individual's work assignment. This training shall be presented and the worker evaluated on a graded approach that considers the types of radiation, the potential exposure levels, and the risks to the individual associated with his/her work assignment. EFS will provide Radiation Worker Training (RWT) for HCCS staff. The records generated for the training program will be maintained at the site and will be available for review.

RWT is an approximately 6–8-hour course consisting of classroom lecture and instruction, practical factors exercise where individuals demonstrate their proficiency in donning and doffing anti-contamination clothing and performance of self-monitoring for radioactivity, as well as a comprehensive written exam. A minimum score of 80% is required on both the exam and the practical factors portion. A minimum of 4 hours annual refresher training will also be required.

Training will include the following:

- Radiation Fundamentals,
- Biological Effects of Radiation,
- ALARA & Dose Limits,
- Precautions and controls used to control exposure,
- Personnel Monitoring Programs,
- Prenatal Exposure Risks,
- Radiological Postings and Limits,
- Contamination Control,
- Radiological Dosimetry/Instrumentation,
- Radiological Emergencies,
- Practical Factors Review,
- Worker Responsibilities.

This page intentionally left blank.



10.0 WORK SUPPORT ACTIVITIES

10.1 Access Control

Site access during project activities will be through the main gate on Harvard Avenue. EFS will have control and responsibility for Site access during remediation activities. This control will be coordinated with the USACE and property owners prior to mobilization. Site access control will include:

- Allowing only authorized personnel to enter Site areas while the remediation is being performed,
- Ensuring physical barriers (such as the fences, gates, and locks) are maintained,
- Proper posting of the site,
- Implementing sign-in and sign-out protocols for personnel moving on and off site, and
- Ensuring that personnel are properly trained and qualified to be on site or in specific work areas.

All visitors will be required to notify the PM upon their arrival at the Site. Once on site, all visitors are required to first report to the field trailer and sign the site entry and exit log. All visitors will receive a brief site safety orientation by the RSO or his designee.

10.2 Radiation Work Permits

RWPs will be used for HCCS Soils Remediation. The EFS developed task specific RWPs will include dosimetry requirements, minimum PPE and any additional RP measures necessary to safely perform the work.

10.3 Engineering Controls

Implementation of engineering controls can reduce the need for PPE by separating the worker from the radiologically contaminated material. During investigation activities dust may be generated. The Site Superintendent, RSO, and SSHO will be constantly alert to the possibility of unacceptable dust levels. Control measures will be implemented for all operations where dust is likely to be generated. Careful planning and implementation of controls will reduce potential dust concentrations. There are a number of specific construction practices, which will reduce levels of airborne particulates. These include:



- Providing for a misting spray during soil and/or concrete removal activities,
- Wetting and misting equipment and contaminated materials,
- Reducing the active work area surface and limiting the number of soil removal/processing operations.

10.4 Posting Requirements

The entry control program is defined in accordance with the results of the radiological monitoring. This begins with posting the locations that allow access or entry into the areas containing the radiation sources. Posting should be at each access point to an EZ and/or CRZ. The RP staff will manage access of personnel to potential sources of radiation and/or radioactive materials.

The following information is placed in conspicuous locations in controlled areas. The following postings will provide notification to individuals of rights and responsibilities.

- NRC Form 3,
- Notice to Employees (10 CFR 19.11),
- OSHA Poster (3165).

10.5 Control of Radioactive Materials

The radioactive materials that require controls to prevent unauthorized access or removal fall into two broad categories: (1) discrete sources that may have some value or use and (2) radioactive waste. The first category will typically be in the form of sources used to perform radiation measurement instrumentation operability checks. The control of radioactive waste from remediation efforts will be defined in work plans, with supporting RPP requirements, to ensure wastes are properly prepared for packaging and transport. Routine leak checks will be performed on each source at the frequency (usually every 6 months) determined by the radiation type (alpha, beta, or gamma).

10.6 Storage and Inventory

Any radioactive source that is licensed to and/or used by EFS at the HCCS shall be stored in a secured location to prevent unauthorized access or removal. Sources shall be stored when not in use. When sources are removed from storage, a log shall be maintained that includes the following:

- Source description,
- Name of person to whom source is assigned,
- Location of source use,



- Date of removal,
- Date of return.

At the beginning and at the end of the project, an inventory of radioactive sources licensed to or maintained by EFS shall be performed that includes the following:

- Sources obtained since last inventory,
- Sources disposed of since last inventory,
- Description and location of all existing sources.

10.7 Decontamination

Decontamination is the process of removing or neutralizing potentially harmful contaminants that have accumulated on personnel and equipment in order to reduce the spread of contamination outside the EZ. Decontamination is critical to the safety and health of Site workers and also protects the community by minimizing the off-site migration of contaminants. One of the most important aspects of controlling contaminated material migration is the prevention of the spread of contamination. Good contamination prevention will minimize employee and public exposure.

The decontamination process is composed of a series of steps performed in a specific sequence. The basic concept is that more heavily contaminated items will be decontaminated and removed first, followed by decontamination and removal of inner, less contaminated items.

During work activities at the Site, all items taken into an EZ must be considered contaminated and must be carefully inspected and/or decontaminated before leaving the site. Any contaminated equipment and material will be cleaned and decontaminated to the satisfaction of the RSO or designee prior to leaving the EZ and will satisfy the **Table 7-1** release criteria. Items not decontaminated will be disposed of as waste.

Radiation detection instruments will be used at the site to monitor for contamination. Portable instruments will be used to monitor or frisk personnel upon exiting EZs and for releasing equipment from EZs and/or the site. The monitoring equipment will typically consist of a dual alpha/beta scintillation detector coupled to an appropriate ratemeter, or equivalent. Instruments equipped with either an alpha sensitive zinc sulfide scintillation detector or a gas flow proportional detector configured with a sample holder will be used to count smears for assessing removable contamination.



10.7.1 Personnel Decontamination

After doffing PPE, personnel will frisk themselves for radioactive contaminants with an appropriate survey instrument to determine if personnel decontamination is warranted. Monitoring is required upon exiting an EZ or any other area under radiological controls as directed by the RSO. If skin contamination above free release criteria is suspected, workers will be required to stay in the area and contact RP technicians for assistance. RP technicians under direction of the RSO or SSHO shall perform skin decontamination and subsequent monitoring. The need for bioassay sampling will be evaluated on a case-by-case basis. Upon release from the area workers will be directed to wash hands and face to remove any potential chemical contaminants.

10.7.2 Equipment Decontamination

Equipment decontamination procedures are summarized below. Any equipment used in an EZ will be decontaminated at the excavation area by removing all loose soil. Subsequent decontamination will be performed as necessary until verified clean, and may include:

- Washing and/or wiping until visibly clean,
- Low pressure, non-phosphate, detergent wash with wiping.

A conditional release survey will be completed at the excavation area prior to moving the equipment to the next work location on site. Small tools and other equipment (i.e., field meters, etc.) will be wrapped in plastic prior to being moved between contaminated areas of the site and will be decontaminated prior to being moved to un-contaminated areas of the site or off site. All equipment will be decontaminated and surveyed in accordance with requirements of the task-specific RWP. As much equipment as possible will be dedicated for single use for the duration of the project and, upon final release, will be surveyed and verified in conformance with the site unrestricted (free) release limits.

Equipment requiring maintenance or repair will generally be decontaminated prior to servicing. Reusable sampling equipment and any other tools used for intrusive work will be decontaminated between sampling locations, as necessary. Following decontamination, all equipment will be surveyed by an RP technician.

10.8 Instrumentation

Detection sensitivities capable of detecting the ROCs to Minimum Detectable Concentrations



(MDCs) will be estimated, using the guidance in NUREG-1575 [Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)] and NUREG-1507. Instrumentation and survey techniques will be chosen to achieve these sensitivities for the HCCS land areas, for both scanning and direct measurements. This will assure identification of areas of elevated activity of a size and activity level that could adversely impact the survey. All instruments will have current calibrations for the radiations and energies found at HCCS, using National Institute of Standards and Technology (NIST)-traceable standards. Operational and background checks will be performed at the beginning of each day of survey activity and whenever there is reason to question instrument performance. Defective instruments will be removed from service and data obtained with that instrument since its previous acceptable performance, will be reviewed for acceptability.

All portable instrumentation will be QC source-checked on a daily basis to ensure instruments are responding correctly. QC checks will be conducted by comparing the instrument's response to a designated radiation source and to ambient background.

QC source checks will consist of one-minute integrated counts with the designated source position in a reproducible geometry, performed at the designated location. Background checks will be performed in an identical fashion with the source removed. The results of the background and QC checks will be recorded on a daily source check log.

This page intentionally left blank.



11.0 RADIOACTIVE MATERIAL SPILLS

11.1 Material Spills

Material spills could occur during remediation activities. Ultimately, a spill could contaminate receiving surface water or cause a release of airborne contaminants. A small spill should be cleaned up immediately but should not trigger activation of a response team. Should a spill occur, the immediate response will include closing off the area of the spill, if possible, cleanup with excavation equipment or hand tools, and sweeping, as appropriate. Any spill that results in a discharge to off-site surface water will be contained by soil berms as needed.

11.1.1 Notifications

All radioactive material spills will be reported immediately to the RSO and SSHO. The sequence of reporting will be as follows:

- The PM or SSHO will immediately notify the Contracting Officer Representative regardless of the size of the spill.

EFS will determine the nature of the spill, its size, and if anyone has been injured as a result of the spill and report findings to the COR and assist the Government PDT with required notifications to other regulatory agencies. Upon notification of a spill, project activity may be immediately suspended and all necessary equipment and personnel will be diverted to spill control and containment. In the event of a significant spill, a Spill Incident Report will be submitted to the Contracting Officer Representative.

11.1.2 Spill Response Equipment

Given the nature of this project, all the necessary equipment and personnel necessary to deal with a release of radioactive material will be available on site. In addition to the heavy equipment and PPE, which is critical to spill control, EFS will have an ample amount of hand tools and containers on hand for spill cleanup.

This page intentionally left blank.



12.0 RECORDS MANAGEMENT

Work activities that involve potential radiation exposure to individuals are required by applicable regulatory agencies to include records that document the work was performed in compliance with applicable parts of the regulations. Records generated for HCCS activities in accordance with the provisions of this plan shall be maintained for the life of the EFS corporate entity or until disposition is legally authorized (minimum of thirty years).

At a minimum, the following types of records, as pertinent to HCCS work activities, shall be produced and retained:

- Individual monitoring records,
- Bioassay results,
- Workplace monitoring records,
- Worker preparation and training records,
- Records of incidents,
- Records of reviews and audits of the RPP.

12.1 Administrative Records

Administrative records generated in support of remediation work activities that involve handling radioactive materials shall be maintained within a records management system that should facilitate storage, tracking, and retrieval. For purposes of this plan, the types of records that shall be maintained in this system shall include, but not be limited to the following:

- Medical records,
- Training records,
- Written declaration of pregnancy by project employees,
- Internal audits of the RPP,
- Source inventory records,
- Copies of licenses and permits, with amendments, for activities.

12.2 Monitoring and Workplace Records

EFS is responsible for administering the radiological work controls and will establish and maintain records of radiological measurements and assessments of the workplace. The types of records to be included are as follows:

- Area radiation survey maps and data,
- Surface contamination maps and data,



- Air monitoring data,
- Effluent release monitoring data (not anticipated),
- Material release survey data,
- Waste packaging and disposal records,
- Instrument calibration and maintenance records.

12.3 Dosimetry Reports

HCCS workers who perform work involving occupational radiation exposure limited by an applicable regulatory authority will be monitored in accordance with provisions of this RPP.

Regulatory agencies require certain reports that are based on these results to be produced and issued. These reports will typically be for the following:

- Reports to the individual,
- Reports to employers (non-EFS).

12.4 Reports to Individuals

Federal regulations require that the licensee or agency responsible for the control of occupational exposure to individuals and responsible for monitoring those individuals as part of that control may be required to provide written reports of the results of that monitoring to the individual.

12.5 Reports to Employers (Non-EFS)

At the written request of an individual who has been monitored for occupational radiation exposure by EFS, but is not an employee of EFS, EFS will provide a written record to that individual's employer or to any other agent specified by the individual. That record will contain a summary for the period of exposure monitored by EFS.



13.0 RADIATION PROTECTION PROCEDURES

EFS will implement the RP requirements of this plan by following SOPs. A list of SOPs planned for use at the HCCS is provided below in **Table 13-1** and are included as **Appendix A**. Should the need arise, additional SOPs may be required or an existing SOP may require revision. Changes to and addition of SOPs will be accomplished using ‘Field Change Requests’ which will be approved by field supervision and the PM for timely implementation.

Table 13-1. Radiation Protection Standard Operating Procedures

Procedure Number	Procedure Title
EFS-RP-01	Access Control
EFS-RP-02	Radiological Postings
EFS-RP-03	Radiation Work Permits
EFS-RP-04	Radiological Surveys
EFS-RP-05	Unrestricted Release Requirements
EFS-RP-06	Survey Documentation and Review
EFS-RP-07	Measurement of Airborne Radioactivity
EFS-RP-08	Portable Count Rate Instruments
EFS-RP-09	Portable Dose Rate Instruments
EFS-RP-10	Low Volume Air Samplers
EFS-RP-11	Fixed Counting Systems
EFS-RP-12	Radioactive Material Control
EFS-RP-13	Dosimetry Issue
EFS-RP-14	Embryo Fetus Protection
EFS-RP-15	Radiological Records
EFS-RP-16	Radiation Worker Training
EFS-RP-17	Personnel Survey and Decontamination
EFS-RP-18	<i>RESERVED</i>
EFS-RP-19	<i>RESERVED</i>
EFS-RP-20	<i>RESERVED</i>

This page intentionally left blank.

Appendix A
Radiation Protection Standard Operating Procedures

1.0 PURPOSE

The purpose of this procedure is to provide consistent methodology for controlling the access of personnel, equipment, and vehicles into radiological areas at the Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

This procedure applies to all personnel and visitors, equipment, and vehicles entering radiologically controlled areas of the HCCS including Exclusion Zones (EZ) and Contamination Reduction Zones (CRZ).

3.0 REFERENCES

1. 10 CFR 19, "Notices, Instructions and Reports to Workers Inspection."
2. 10 CFR 20, "Standards for Protection Against Radiation."
3. EM 385-1-80 "Radiation Protection Manual," United States Army Corps Of Engineers (USACE).
4. HCCS Radiation Protection Plan (RPP).
5. EFS-RP-02, "Radiological Posting Requirements."
6. EFS-RP-03, "Radiation Work Permits."
7. 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."

4.0 GENERAL

4.1 Discussion

Access controls are used to ensure the radiological safety of personnel entering into Controlled Areas. These controls include, but are not limited to, Training, Dosimetry, Posting, Area Monitoring, and Radiation Work Permits (RWPs).

4.2 Definitions

ALARA: As low as reasonably achievable.

Controlled Area: An area outside of a restricted area, but inside the site boundary, where access is limited by HCCS Project Management.

HAZWOPER: 40-Hour Hazardous Waste Operations and Emergency Response training in accordance with 29 CFR 1910.120.

Radiation Work Permit (RWP): A document or series of documents prepared by the Safety and Health Group to inform workers of the radiological, industrial hygiene, and other safety conditions which exist in the work area and task-related radiological and other safety requirements.

Radiation Worker: An individual who accesses any Restricted Area unescorted. Radiation Workers shall have successfully completed all requisite medical and training requirements for performing work in Restricted Areas.

RPT: Radiation Protection Technician.

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

RSO: Radiation Safety Officer.

SSHO: Site Safety and Health Officer.

SRD: Self-Reading Dosimeter.

Visitor: An individual who accesses the project site for purposes other than for assignment as a Project Worker (e.g., site visit, performance of an essential short-term task).

5.0 RESPONSIBILITIES

5.1 Site Safety and Health Officer (SSHO)

- The SSHO is responsible for ensuring that all activities performed within this procedure conform to the requirements of the HCCS Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP).
- Authorizing escorted visitor entries into Restricted Areas. This responsibility may be designated.
- Evaluating visitor entries to Restricted Areas to minimize or eliminate exposure risk to personnel who lack adequate training.

5.2 Radiation Safety Officer (RSO)

- Implementing this procedure.
- Approving RWPs to control access to Restricted Areas.
- Reviewing and approving training programs related to work in Restricted Areas.
- Implementing the requirements of the HCCS Radiological Protection Program.
- Providing direction to the Project Personnel regarding radiological matters.
- Authorizing escorted visitor entries into Restricted Areas. This responsibility may be designated.
- Evaluating visitor entries to Restricted Areas to minimize or eliminate exposure risk to personnel who lack adequate training.

5.3 Radiation Protection Technician (RPT)

- Identifying and posting Restricted Areas.
- Providing RWP briefings to individuals entering Restricted Areas.
- Conducting radiation and contamination surveys and keeping legible records.
- Monitoring work activities to ensure compliance with the requirements of the Radiological Protection Program.

5.4 Project Supervisor

- Ensuring that personnel assigned to work in Restricted Areas or with radioactive material, attend required training, and perform work in a radiologically sound and safe manner.
- Contacting the RSO, or designee, to obtain approval to bring escorted visitors into Restricted Areas of the HCCS.

- Notifying the RSO or designee, in advance (when possible), of the need to bring any non-project owned equipment/vehicles into the Restricted Area to arrange for baseline contamination surveys.

5.5 Project Personnel

- Attending designated training classes.
- Following directions from the RPT with regards to Safety and Health.
- Maintaining their personnel exposures ALARA.
- Limiting the amount of material taken into Restricted Areas to that necessary for task performance.
- Working in a manner so as to prevent spread of contamination and reduce airborne radiological emissions to the extent possible.

6.0 PREREQUISITES

- 6.1** Individuals requiring unescorted access into a Restricted Area shall submit the following documentation to the SSHO **prior** to entry:
- Evidence of initial 40-Hour OSHA HAZWOPER Training.
 - Evidence of the annual 8-Hour OSHA HAZWOPER Refresher Training, if the 40-Hour training is greater than 1 year old.
 - Current medical examination performed within the past 12 months.
 - Evidence of successful completion of Radiation Worker Training (RWT).
- 6.2** Individuals requiring unescorted access into a Restricted Area shall meet the requirements for Restricted Area access and have the following at a minimum:
- Thermoluminescence Dosimeter (TLD) or Self-Reading Dosimeter (SRD).
 - Personal Protective Equipment (PPE) specified by posting and/or RWP.
- 6.3** Visitor access into Restricted Areas is limited to essential tasks which meet all of the following requirements:
- The task cannot be performed by appropriately trained Project Personnel.
 - The task is time critical in nature and would have a negative impact on safety and health or project operations if not performed.
 - The task cannot be deferred until the Restricted Area is remediated or down posted.

7.0 PRECAUTIONS AND LIMITATIONS

- Visitors shall receive a visitor specific site briefing on the various industrial, chemical, and radiological hazards at the HCCS.
- Personnel, equipment, and vehicle entry control shall be maintained for each radiological area.
- No radiological control(s) shall be installed in any area that would prevent the rapid evacuation of personnel in an emergency situation.
- Trained emergency response personnel (Fire Dept., Ambulance/EMT, Law Enforcement) responding to on-site emergencies are exempt from the requirements of this procedure.
- Any member of the public exposed to radiation and/or radioactive material at the HCCS shall not exceed 0.1 rem Total Effective Dose Equivalent per year.
- All visitors entering into a Restricted Area shall be escorted at all times by a qualified radiation worker. The RSO and SSHO or designee(s) shall approve these entries. The escort is responsible for visitor compliance with site protocols.

- Visitors shall not perform any work of an intrusive nature (i.e., digging, drilling, sampling, etc.) or an abrasive nature (i.e., welding, sanding, grinding, etc.) in Controlled Areas unless evaluated and approved by the RSO or designee.
- Visitors may only enter those areas where hazardous atmospheres do not exceed 50% of the Permissible Exposure Limit and where radiation exposures would not exceed the annual dose limit to a member of the public as specified in 10 CFR 20.
- The RSO and SSHO shall ensure that risk of exposure to hazardous materials is minimized or eliminated prior to authorizing visitor entry into Restricted Areas. No work of an intrusive nature that may produce radioactive airborne particulates shall take place during visitor access to a restricted area.
- RPTs shall perform exit frisking of visitors from Restricted Areas when frisking is required by RWP. Visitor access times and dates, PPE, controls and conditions shall be documented.

8.0 APPARATUS

None.

9.0 RECORDS

- HCCS Visitor Access Control Form.
- RWP Access Registers are maintained under separate procedure.
- Quality Records generated under this procedure will be maintained and submitted into the Project Resident Management System (RMS) portal as required.

10.0 PROCEDURE

10.1 Restricted Areas

1. Enter the Restricted Area **ONLY** through the designated Access Control Point unless instructed otherwise by the RPT.
2. Inform the Access Control Point RPT of the nature of your work in the Restricted Area. Provide details as requested by the RPT.
3. Adhere to the requirements of Section 10.2 of this procedure if taking equipment or vehicles into the Restricted Area.
4. Review the applicable RWP and assemble and dress in the appropriate PPE.
5. Sign-in on the RWP Access Register. Signatures must be clear and legible, and must be accompanied by time of access.
6. Conduct all activities in a safe manner while working in the Restricted Area. Adhere to established safety and housekeeping protocols.
7. Exit the Restricted Area **ONLY** through the Access Control Point unless instructed otherwise by the RPT. Perform an exit frisk as required by RWP.
8. Sign-out on the appropriate RWP Access Register. Signatures must be clear and legible, and must be accompanied by time of egress.

10.2 Equipment and Vehicles Entering and Exiting Restricted Areas

1. Notify the RPT of any equipment/vehicles that need to be taken into a Restricted Area. Incoming surveys are performed on equipment and materials entering Restricted Areas. The decision regarding what must be surveyed will be made by the RSO. The degree of thoroughness of the survey and the requisite cleanliness of the equipment is at the discretion of the RSO.
2. Bring only the required equipment/supplies necessary for the task into the Restricted Area.

3. When practicable, use contamination prevention methods such as wrapping or sleeving of equipment taken into a CA or ARA.
4. Remove as much packaging material as possible (i.e., plastic or cardboard) prior to entering a Restricted Area.
5. Notify the RPT of any equipment/vehicles that need to be removed from a Restricted Area.

10.3 Visitor Escorts

1. Discuss planned activities, work locations, and site hazards with the Visitor. Discuss any restrictions on where the Visitor may go and what the Visitor may do within the Restricted Areas. Define the obligations of the Visitor with respect to following instructions of the escort and of safety personnel.
2. Provide the Visitor with a copy of the HCCS Visitor Access Control Form (Attachment 1).
3. Instruct the Visitor to review the form, complete the top portion, and sign.
4. Answer any questions the Visitor may have. RP personnel are available to answer questions as needed.
5. Sign the HCCS Visitor Access Control Form acknowledging escort responsibilities.
6. Obtain RSO and SSHO signature permitting Restricted Area access.
7. Give completed form to RP Personnel.
8. RP Personnel should assign a personnel dosimeter to the Visitor or group of visitors (this is a TLD unless otherwise instructed by the RSO). Note Self-Reading Dosimeter (SRD) in/out readings, if used, on the RWP Access Register.
9. Review the appropriate RWP with the Visitor, and ensure the Visitor dons PPE and signs and records the time of entry onto the RWP Access Register.
10. Escort the Visitor into the Restricted Area observing all escort responsibilities.
11. Upon completion of activities, assist visitor with PPE removal, and RWP sign-out. An RPT will perform the exit frisking.
12. Escort the Visitor out of the Restricted Area.
13. Take the personnel dosimeter and give it to the RP personnel. RP Personnel shall notify the RSO immediately if SRD readings indicate a personnel exposure.

11.0 ATTACHMENT

Attachment 1: HCCS Visitor Access Control Form (front and back)



Access Control

Attachment 1

HCCS Visitor Access Control Form (Front)

Name _____ Representing _____

SSN _____ - _____ - _____ Mailing Address _____

Some work at the HCCS involves exposure to hazardous environments, radiation, or radioactive materials. In keeping with the provisions of the Code of Federal Regulations Title 10, Part 19, this is to inform you of the extent of the hazards to which you may be exposed.

Radiation and radioactive materials on this project site are confined within clearly posted and delineated areas. Other hazardous materials may be present in these areas. Signs in these areas are magenta or purple and yellow in color and contain the international symbol for radiation, a trefoil or **three-bladed design. (ESCORT: SHOW VISITOR AN EXAMPLE OF A RADIOLOGICAL POSTING).**

During your visit, you will be provided with an escort. You must remain with your escort at all times. In the unlikely event of an incident involving radioactive or other hazardous materials, your escort will provide you with instructions. Comply with the instructions of your escort. If exit frisking is required by the RWP, Radiation Protection Personnel will perform the exit frisk.

Do not enter any areas posted “RADIATION AREA,” “HIGH CONTAMINATION AREA,” or “AIRBORNE RADIOACTIVITY AREA.”

Do not perform work of an intrusive nature (i.e., digging, drilling, sampling, etc.) or any abrasive work (i.e., welding, sanding, grinding, etc.) without specific written approval of the RSO.

Nuclear Regulatory Guide 8.13, “Instructions Concerning Pre-natal Radiation Exposure,” is available for review upon request.

Address any questions you may have to your escort or to the person you are visiting. Questions may also be directed to the Safety and Health Department.

I have read and understand the above. I agree to comply with the terms of this form.

Visitor Signature

Date

I have reviewed the above with the visitor and agree to comply in full with HCCS established radiological escort protocols including, but not limited to, those specific requirements specified on the back of this form.

Escort Signature

Date

Restricted Area Access Authorized:

RSO or designee Signature

Date

SSHO or designee Signature

Date

ALL SIGNATURES MUST BE PRESENT ON THIS FORM PRIOR TO RESTRICTED AREA ACCESS!



Attachment 1 (Back)
HCCS Visitor Access Control Form

SSHO/RSO Requirements to Minimize or Eliminate Exposure Risks:

SSHO/RSO Remarks:

SSHO Initials: _____ RSO Initials: _____

1.0 PURPOSE

The purpose of this procedure is to provide consistent methodology for posting of the various radiological hazard areas of the Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

This procedure applies to all areas within the HCCS, which require radiological postings.

3.0 REFERENCES

1. 10 CFR 19, "Notices, Instructions, and Reports to Workers; Inspection."
2. 10 CFR 20, "Standards for Protection Against Radiation."
3. EM 385-1-80 "Radiation Protection Manual," United States Army Corps of Engineers (USACE).
4. HCCS Radiation Protection Plan (RPP).

4.0 GENERAL

4.1 Discussion

Radiological postings are used to delineate areas containing radiological hazards and to inform personnel of hazards. In addition, supplemental or informational postings may be included which provide personnel with entry requirements or protective equipment requirements. Barriers may be used in conjunction with postings to ensure that personnel do not inadvertently enter into an area with a radiological hazard. Barriers at the HCCS and the vicinity properties are normally composed of rope, tape, or fencing.

4.2 Definitions

Airborne Radioactivity Area (ARA): Any area where the measured concentrations of airborne radioactivity above natural background exceed, or are likely to exceed, 25% of the Derived Air Concentration (DAC) values listed in 10 CFR 20, Appendix B, Table I, Column 3.

Controlled Area: Means an area outside of a restricted area, but inside the site boundary, where access is limited by HCSS Project Management.

Contamination Area (CA): Means any area accessible to personnel with loose surface contamination values in excess of the values specified in the United States Army Corps of Engineers (USACE) Radiation Protection Manual, "Acceptable Surface Contamination Levels," (also refer to the Site Safety and Health Plan) or any additional area specified by the Radiation Safety Officer (RSO). The Contamination Area posting requirement is more restrictive than the Radioactive Material Area posting requirement. Any area posted as a Contamination Area shall also be considered to be a Radioactive Materials Area.

HCCS: Means the Harshaw Chemical Company proper, as well as any vicinity properties under control by Project Management.

Posting: A standardized sign or label which bears the standard trefoil radiation symbol in magenta or purple on a yellow background and information concerning a specific radiological hazard.

Radiation Area (RA): Any area accessible to personnel where the whole body dose rate exceeds 5 mrem/hr but less than 100 mrem/hr at 30 cm from the source.

Radioactive Materials Area (RMA): Any area or room where quantities of radioactive materials in excess of 10 times the 10 CFR 20, Appendix C quantities are used or stored, or any area designated by the RSO which does not exceed the site Contamination Area criteria.

Restricted Area: Means an area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Implementation of this procedure.
- Reviewing pertinent survey data and making periodic tours to verify all areas within the HCCS are properly posted.
- Authorizing the de-posting or down-posting of areas.
- Providing technical direction to the Radiation Protection Technicians (RPTs).

5.2 Radiation Protection Technician (RPT)

- Directing the placement of radiological postings and barriers.
- Performing periodic radiation / contamination surveys to ensure radiological conditions have not changed.

5.3 Project Supervisor

- Ensuring that personnel working in their particular area obey all radiological postings.

5.5 Project Personnel

- Obeying all radiological postings.
- Following directions from the RPT with regards to radiological postings.
- Maintaining their personnel exposures as low as reasonably achievable (ALARA).

6.0 PREREQUISITES

RPTs will be trained to assess and recognize the various radiological hazards present at the HCCS.

7.0 PRECAUTIONS AND LIMITATIONS

- Barriers and other means shall be used as required to maintain control of areas requiring posting.
- At a minimum, all access / egress points to areas requiring radiological posting shall be conspicuously posted with the appropriate signs which includes area descriptions and specific requirements for entry.
- Appropriate signs should be placed approximately every 40 feet around the perimeter of a posted area. At least one sign should be placed on each side of an area's boundary, visible from any normal avenue of approach. These signs require only area identifiers (e.g., Restricted Area, Radioactive Materials Area, Radiation Area, etc.) in addition to the standard "Caution" or "Warning" and the trefoil.

- An RPT with the appropriate field survey instrumentation may serve as the radiological posting in situations where the task is of a short duration or at the discretion of the RSO.
- No radiological control(s) shall be installed in any area that would prevent the rapid evacuation of personnel in an emergency situation.
- Trained emergency response personnel (Fire Dept, Ambulance / EMT, Law Enforcement) responding to on-site emergencies are exempt from the requirements of this procedure.
- Postings should be as clear and concise as possible to prevent confusion on the part of personnel desiring to enter an area.
- Postings should not be hung from ladders, electrical wire, switches, vehicles, or any other item that could be damaged, moved, or could cause injury to personnel.
- If more than one level of radiological posting is required in an area, posting for each unique condition shall be identified starting with the highest hazard potential. However, it is not required to post areas with area identifiers that are superseded by postings identifying a higher hazard potential (e.g., posting a Contamination Area as a Radioactive Materials Area, etc.).
- Radiological postings shall not be moved or altered without approval from the RSO or the RPT covering the work.

8.0 APPARATUS

- Yellow and magenta barrier supplies (e.g., rad-rope, rad-tape, rad-ribbon, etc.).
- Signs and inserts as required.
- Radioactive Material Labels or tags.
- Stands or Stanchions.

9.0 RECORDS

All surveys performed for radiological posting placement will be forwarded to project document control.

10.0 PROCEDURE

10.1 Controlled Areas

All access points to areas meeting the definition of a Controlled Area shall be posted with the words "CONTROLLED AREA," or "US GOVERNMENT PROPERTY," plus any additional verbiage deemed appropriate by Project Management.

10.2 Restricted Areas

All access points to areas meeting the definition of a Restricted Area shall be posted with the words "RESTRICTED AREA."

10.3 Contamination Areas

All access points to areas meeting the definition of a Contamination Area shall be posted with the words "CAUTION, CONTAMINATION AREA," and with the words "RESTRICTED AREA," as well as any special instructions deemed necessary by the RSO.

10.4 High Contamination Areas

All access points to areas meeting the definition of a Contamination Area shall be posted with the words "CAUTION, HIGH CONTAMINATION AREA," and with the words "RESTRICTED AREA," as well as any special instructions deemed necessary by the RSO.

10.5 Radiation Areas

All access points to areas meeting the definition of a Radiation Area shall be posted with the words "CAUTION, RADIATION AREA" as well as any special instructions deemed necessary by the RSO.

10.6 High Radiation Areas

All access points to areas meeting the definition of a High Radiation Area shall be posted with the words "DANGER, HIGH RADIATION AREA" as well as any special instructions deemed necessary by the RSO.

10.7 Radioactive Materials Areas

All access points to areas meeting the definition of a Radioactive Materials Area shall be posted with the words "CAUTION, RADIOACTIVE MATERIALS AREA," as well as any special instructions deemed necessary by the RSO.

10.8 Airborne Radioactivity Area

All access points to areas meeting the definition of an Airborne Radioactivity Area shall be posted with the words "CAUTION, AIRBORNE RADIOACTIVITY AREA," as well as any special instructions deemed necessary by the RSO.

10.9 Posting / De-Posting / Down-Posting

Posting, De-posting, and Down-posting activities should be noted in the appropriate technician logbook with reference to applicable survey number(s).

11.0 ATTACHMENTS

None.

1.0 PURPOSE

The purpose of this procedure is to provide consistent methodology for developing, utilizing, and terminating Radiation Work Permits (RWP) at the Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

This procedure applies to all personnel working on a task for which an RWP is required; and includes RWP requests, preparation, use, and termination.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. 29 CFR 1910.1200, "Hazard Communication"
3. HCCS Radiation Protection Plan (RPP).
4. EFS-RP-01, "Access Control."

4.0 DEFINITIONS

Airborne Radioactivity Area: Any area where the measured concentrations of airborne radioactivity above natural background exceed, or are likely to exceed, 25% of the Derived Air Concentration (DAC) values identified in Section 6.0 of the Radiation Protection Plan; and as listed in 10 CFR 20, Appendix B, Table I, Column 3.

Contamination Area (CA): Means any area accessible to personnel with loose surface contamination values in excess of the values specified in the United States Army Corps of Engineers (USACE) Radiation Protection Manual, "Acceptable Surface Contamination Levels," (also refer to the HCCS RPP) or any additional area specified by the Radiation Safety Officer (RSO). The Contamination Area posting requirement is more restrictive than the Radioactive Material Area posting requirement. Any area posted as a Contamination Area shall also be considered to be a Radioactive Materials Area.

Radiation Work Permit (RWP): A document or series of documents prepared by Radiation Protection to inform workers of the radiological and industrial hygiene conditions which exist in the work area and the radiological requirements for the job.

Radiation Area (RA): Any area, accessible to personnel, where the whole-body dose rate exceeds 5 mrem/hr but less than 100 mrem/hr at 30 cm from the source.

Radioactive Materials Area (RMA): Any area or room where quantities of radioactive materials in excess of 10 times the 10 CFR 20, Appendix C quantities are used or stored, or any area designated by the RSO which does not exceed the site Contamination Area criteria.

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Implementation of this procedure.
- Approving all protective measures incorporated into the RWP with regards to Radiological Safety.

5.2 Radiation Protection Technician (RPT)

- Conducting radiation and contamination surveys and keeping legible records.
- Preparing RWPs to control access to and activities in radiological areas.
- Monitoring worker compliance with RWP requirements.

5.3 Project Supervisor

- Ensuring personnel under their direction comply with Radiation Protection requirements.
- Informing radiation and/or industrial hygiene personnel of any changes in work scope.

5.4 Project Personnel

- Reviewing the correct RWP for the task to be performed.
- Accurately and legibly completing required information on the RWP Access Register.
- Observing radiological postings.
- Obeying oral and written radiological and industrial hygiene control instructions and procedures, including instructions on RWPs.
- Maintaining an awareness of radiological and industrial hygiene conditions in the work area.

6.0 PREREQUISITES

1. RWPs shall be required for the following:
 - All tasks requiring entries into Restricted Areas.
 - As specified by the SSHO, the RSO, or their designees.
2. Approval to start work will be provided only after the RWP is signed by both the SSHO and RSO, or their designee(s).
3. Prior to use of an RWP, the RSO or designee shall:
 - Define an access location appropriate for the RWP.
 - Review the inventory at the applicable Access Control Points and shall verify that Personal Protection Equipment (PPE), instruments, and other safety-related equipment necessary to support the requirements of the RWP are available.
4. Prior to entry, all personnel working under an RWP must:
 - Satisfy medical and training requirements as established in the Access Control procedure.
 - Be adequately briefed by the Radiation Protection Group regarding:
 - Work to be performed and the associated RWP requirements.
 - Safety procedures to be followed for its completion.

7.0 PRECAUTIONS AND LIMITATIONS

- Personnel shall not deviate from the requirements, precautions, or other instructions on the RWP without authorization from the SSHO or RSO or designees.
- A copy of the RWP shall be posted at the work site. The original shall remain at a central location (Safety and Health office). Associated support documents containing environmental conditions (soil activities, contamination surveys, etc.) shall be maintained by the RSO and are available upon request.
- An RWP is not required when responding to emergency situations where serious consequences could result if time were taken to prepare the RWP.

8.0 APPARATUS

None.

9.0 RECORDS

1. Radiation Work Permit (RWP).
2. Radiation Work Permit Access Register.

10.0 PROCEDURE

10.1 Active RWP Use

1. The Safety and Health group will activate the RWP upon review and signature by the SSHO and RSO.
2. A copy of active RWPs will be maintained at applicable Access Control Points.
3. The SSHO, RSO, or designee shall review the inventory and shall verify that PPE, instruments, and other safety-related equipment necessary to support the requirements of the RWP are available at the applicable Access Control Points. Inventory reviews shall also be performed, as necessary, during the course of work on the RWP.
4. All workers who will be working on tasks supported by an RWP will be provided an initial briefing on the RWP by a Safety and Health representative:
 - Upon their entry on the RWP.
 - Upon initial entry following revision of a RWP.
 - When significant changes occur in the work area.
5. The purpose of the briefing is to ensure:
 - All Safety and Health conditions, requirements, and special precautions are fully understood by the workers.
 - Ensure that all anticipated tools, materials, and equipment are assembled for the work.
 - Ensure that work party members have been issued any radiological monitoring or protective devices specified for the work.
6. All personnel will read and verify that they understand and agree to comply with the terms of the RWP by signing in on the RWP Access Register (Attachment 2).
7. While working under an RWP, personnel are responsible to know and understand:
 - The tasks that fall under the RWP.
 - Procedural controls and precautions taken to:
 - Reduce spread of contamination.
 - Reduce airborne emissions of radionuclides.
 - Reduce dose to workers and the public as low as reasonably achievable (ALARA).
 - Requirements to apply the sound radiological and safe work practices taught in indoctrination and continuing training.
8. **ALL PERSONNEL** have stop work authority for all phases of work under an RWP. Stop work authority can be implemented when personnel safety is jeopardized due to:
 - A change in the radiological (or other hazard) environment occurs, requiring additional controls and/or precautions.
 - If poor work practices are employed.
 - If RWP, ALARA, or procedural controls and/or precautions are violated.
9. Personnel shall sign in/out on the RWP Access Register for each entry into and egress from an area including when exiting the area for short break periods and when transferring to work on a different RWP.
10. Upon completion of work or at the end of the shift the Work Party Supervisor shall ensure that:

- Access Control Point and Work Area conditions are satisfactory. This includes housekeeping, safe storage of equipment, ensuring any required contamination control measures are implemented, and accurate completion of RWP Access Registers.
- All radiological and Industrial Hygiene monitoring and protection devices that were issued have been returned to the Safety and Health (S&H) Group.

10.2 Termination of RWP

1. If the work was not or cannot be completed within the duration period of the RWP, an extension of the RWP should be requested.
2. An RWP is considered “terminated” upon:
 - Signature by the SSHO, RSO, or designee(s) in the appropriate section on the original RWP.
 - If the duration period for the RWP has been exceeded and the RWP was not extended.
3. Upon Completion of an RWP task, the Work Party Supervisor shall ensure that:
 - Access Control Point and Work Area conditions are satisfactory. This includes housekeeping, safe storage of equipment, ensuring any required contamination control measures are implemented, and accurate completion of RWP Access Registers.
 - All radiological and Industrial Hygiene monitoring and protection devices that were issued have been returned to the Safety and Health (S&H) Group.
4. Upon completion of the job, the RWP copy and RWP Access register shall be returned to the S&H group for disposition.
5. Completed RWP forms (originals) and RWP Access Registers are quality records. These documents shall be maintained by the S&H Group until transmitted to Project Records.

11.0 ATTACHMENTS

Note: Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachments.

Attachment 1: Radiation Work Permit (Typical)

Attachment 2: Radiation Work Permit Access Register (Typical)

1.0 PURPOSE

This procedure establishes consistent methodology for performing radiation and contamination surveys at Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

This procedure is applicable to all personnel trained and qualified to perform radiation and contamination surveys at HCCS.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. EM 385-1-80 "Radiation Protection Manual," United States Army Corps of Engineers (USACE).
3. PFS "Radiation Protection Plan (RPP)."
4. EFS-RP-115, "Access Control."
5. EFS-RP-130, "Release of Materials for Unrestricted Use."
6. EFS-RP-17, "Survey Documentation and Review."

4.0 GENERAL

4.1 Discussion

Radiological surveys are performed to detect and assess radiological conditions, which may be encountered at HCCS.

4.2 Definitions

Contact Dose Rate: A radiation dose rate as measured at contact or within 1/2 inch of the surface being measured.

CPM: Counts per minute.

Dose Rate: The quantity of absorbed dose delivered per unit of time.

DPM: Disintegrations per minute.

General Area Dose Rate (GA Dose Rate): The highest radiation dose rate accessible to any portion of the whole body measured at 30 cm (12 inches) from a significant radiation source or combination of sources.

LAW: Large area Wipe (i.e., Masslinn).

MDA: Minimum Detectable Activity.

Survey: An evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of ionizing radiation under a specific set of conditions.

5.0 RESPONSIBILITIES

5.1 Site Safety and Health Officer (SSHO)

- The SSHO is responsible for ensuring all surveys are performed in accordance with the requirements of the Accident Prevention Plan/Site Safety and Health Plan (APP/SSHHP).

5.2 Radiation Safety Officer (RSO)

- Implementation of this procedure.
- Ensuring appropriate radiation surveys are performed to measure and document radiation levels.
- Ensuring all completed surveys are adequately reviewed.
- Providing technical direction to the RPTs.

5.3 Radiation Protection Technician (RPT)

- Conducting and documenting radiation surveys.
- Performing all necessary pre/post use operability checks.
- Creating neat, legible, and concise records.

6.0 PREREQUISITES

Prior to performing a radiological survey, personnel should review previous survey data and familiarize themselves with possible radiological hazards.

7.0 PRECAUTIONS AND LIMITATIONS

1. Personal Protective Equipment (PPE) should be appropriate for the level of contamination expected and shall be in compliance with APP/SSHP, Radiation Work Permits (RWPs), or other work specific controlling documents. At a minimum, gloves or tweezers should be used when handling swipes.
2. Direct probe surveys may be used to demonstrate compliance with removable limits given in Attachment 1 (Acceptable Surface Contamination Levels), and discussed in EFS-RP-130, "Release of Materials for Unrestricted Use." When instrumentation is used in this manner it should be capable of achieving the removable minimum detectable count (MDC) requirements.
3. Surface contamination limits are contained in Attachment 1.
4. Instruments used in surveys should be capable of achieving a Minimum Detectable Activity (MDA) that is less than the applicable release limits.
5. In high background areas it may not be possible to achieve the required survey MDAs for beta/gamma instruments.

8.0 APPARATUS

1. Radiation and contamination survey instruments.
2. Smears.
3. Masslinn.
4. Personal Protection Equipment.

9.0 RECORDS

Survey documentation to be completed per EFS-RP-17, "Survey Documentation and Review."

10.0 PROCEDURE

10.1 General Instructions

- Select the survey instrument based on the anticipated hazards and dose rates as determined by a review of previous survey data and ongoing work activities.

- Perform pre-operational and response checks in accordance with the operating procedures for the instrument.
- Remove any defective instrument from service.
- Obtain survey forms and any other material required to document survey results.

10.2 Routine Survey Frequencies

- The RSO shall specify areas for routine monitoring surveys and the frequency of such surveys. The RSO should maintain a routine survey frequency schedule. The schedule is NOT considered a record and does not need to be retained.
 - The following areas should be considered for a routine survey on a DAILY basis:
 - Access Control Points.
 - Haul Roads (smears only). Designated eating, drinking, and smoking areas within Restricted Areas.
 - Radiological Counting Labs and sample prep areas.
 - Any other area specified by the RSO.
- The following areas should be considered for a routine survey on a WEEKLY basis: Occupied offices. Conex storage trailers. Heavy Equipment within Restricted Areas.

10.3 Incoming Surveys.

The RSO can direct incoming surveys be performed on equipment and materials arriving onto the site. The purpose of an incoming survey is to protect the client from financial liability associated with decontaminating equipment that arrived on the site with existing contamination. The degree of thoroughness of the survey and the requisite cleanliness of the equipment is at the discretion of the RSO.

10.4 Surveys of Materials, Vehicles, and Personnel leaving Restricted Areas.

All materials, vehicles, and personnel shall perform surveys upon leaving Restricted Areas that have a potential for spread of contamination. The RSO or designee can direct that additional surveys be performed as needed to monitor for spread of contamination.

10.5 Direct Total Contamination Surveys.

- All items being surveyed should appear to be clean prior to being surveyed. To the extent possible, all interior and exterior surfaces should be free from oil and visible dirt. The RSO may dictate the required degree of cleanliness, based on the purpose of the survey and the history of the item being surveyed.
- Obtain proper instrumentation for the survey. Ensure that the instruments are currently calibrated and have been performance checked prior to the survey.
- Determine and record the background count in the area to be surveyed. Ensure that the background is representative of the measurement to be taken. Calculate and record the MDA on the appropriate survey form. Verify the MDA has been calculated for the background at the point of use and is less than the applicable site release criteria. In no case shall the background count time be less than the sample count time.
- Perform a scanning survey of the item. Concentrate survey measurements on areas most likely to be contaminated. The fraction of the total area scanned is subjective, based on

technician experience, an item's use history, and RSO guidance. Typically, the scan frequency is a minimum of 10% of accessible surface areas.

- Obtain static measurements at locations with the highest potential for contamination. The number of survey points selected is subjective, based on technician experience, an item's use history, and RSO guidance. The count time should be consistent with the MDA calculation. A typical count time is one minute for digital scalers and until the meter reading stabilizes for analog ratemeters.
- Record and identify all locations surveyed on the appropriate survey form(s). The use of diagrams or sketches is recommended.
 - **Beta-Gamma Probe** - In high background areas it may not be possible to achieve the required survey MDAs. This should be noted on the survey cover sheet, and should be brought to the attention of the RSO.
 - **Alpha Probe** - The performance check background may be used in place of background count in the area to be surveyed. A good practice is to check the probe for light leaks or for faulty cables if positive results begin appearing.
- All measurements shall be reported in units of "dpm" unless otherwise directed by the RSO. Examples include "dpm/100 cm²," and "dpm/probe."
- Direct non-smearable hot spots may be averaged over 1 square meter to determine compliance with release levels. If the entire item is less than 1 square meter in area, the entire surface area may be averaged. Bolt on parts of a vehicle should not be considered separate items.
- The method for determining an average activity is to mark a 1 square meter area on the piece to be surveyed that is roughly centered on the hot spot. Take 1 measurement at the highest activity point of the hot spot. Take 4 (or more) other measurements within the square meter at locations representative of the whole square meter. Record count-rate of each individual measurement. Calculate the activity of all measurements being averaged, including those that are less than the MDA and those with a calculated activity less than zero. Calculate the average of all measurements and record them on the survey form.
- Complete the appropriate survey form.

10.6 Removable Contamination

With RSO approval, removable contamination surveys may be disregarded, provided that direct survey measurements and instrument MDAs are below site removable contamination limits for release.

- All items being surveyed shall be clean prior to being surveyed. All interior and exterior surfaces should be free from oil and visible dirt. The RSO may dictate the required degree of cleanliness, based on the purpose of the survey and the history of the item being surveyed.
- Wipe each location of interest with moderate pressure area using a standard 1 ¾-inch swipe. The area wiped should be approximately 100 cm². Larger areas may be wiped. It can be inferred that if the wipe meets the required limit for 100 cm² when it was actually taken from a larger area, the object will pass the 100 cm² criteria. No special documentation is required if the wiped area exceeds 100 cm². If the object is smaller than 100 cm², the area of the entire object should be wiped.

- Large area wipes (LAW), also commonly referred to by the trade name “Masslinn,” may be used to supplement smear surveys for removable contamination. The use of LAWs should be documented on the survey form with the notation “LAW,” or equivalent.
- Ensure each used swipe (i.e., smear or large area wipe) is handled, stored, and transferred in such a fashion as to prevent loss of sampled material or cross-contamination with other personnel and other swipe samples.
- Record the location of each wipe on the appropriate survey form. It is preferable to record the location by circling the sequential number location on a survey map where the wipe was taken.

10.7 Analyzing Swipes

- Smear samples should be counted using available scintillation or gas-flow proportional laboratory counters, when practicable. Field instruments may be used for smear counting at the discretion of the RSO.
- LAW samples may be counted using field instruments. The use of laboratory counters is inappropriate.
- Determine and record the background count-rate. Calculate and record the MDA on the appropriate survey form. Verify the MDA has been calculated for the background at the point of use and is less than the applicable site release criteria. In no case shall the background count time be less than the sample count time.
- Remove each swipe from the paper backing, as needed. The use of tweezers is recommended.
- Place the swipe in the counter and close.
- Count for the designated counting time.
- Record the gross result under count in the appropriate column (either alpha or beta-gamma) of the survey form.
- Calculate and record the activity. Removable contamination survey results shall be reported in units of “dpm” unless otherwise directed by the RSO. Examples include “dpm/100 cm²” and “dpm/LAW.”

10.8 Gamma Surveys

- Routine gamma surveys may be used to detect the gradual buildup of gamma emitting contaminated materials in soils. This may occur on heavy equipment, heavy traffic, or egress points from contaminated areas. Normal uncontaminated trash should be gamma surveyed prior to leaving the site.
- Obtain proper instrumentation for the survey. Ensure that the instruments are currently calibrated and have been performance checked prior to the survey.
- Perform the survey with the appropriate detector using techniques specified by the RSO.
- Complete the appropriate survey form.

10.9 Gamma Dose Rate Surveys

- Obtain proper instrumentation. Ensure that the instrument is currently calibrated and has been performance checked prior to the survey.
- When entering areas with known radiation levels, select the appropriate scale.

- Observe the meters as you enter the area. If necessary, change scales to maintain on-scale reading.
- Perform gamma dose rate surveys as follows:
- Monitor dose rates from the lower thighs to head level, recording the highest level as General Area Dose Rate.
- Monitor dose rates 30 cm (12 inches) from a significant radiation source recording the highest level as General Area Dose Rate.
- If dose rate sources are predominantly from overhead, then denote on survey.
- Perform contact gamma dose rate measurements with the detector within 1/2-inch of the surface to be surveyed.
- Additional measurement locations should be clearly identified in survey documentation.
- Record all survey results on the appropriate survey form.

11.0 CALCULATIONS

11.1 Sample Activity

$$DPM = \frac{\left(\frac{TotalSampleCounts}{SampleCountTime} \right) - \left(\frac{TotalBkgCounts}{BkgCountTime} \right)}{(E) (A)}$$

Where:

E = Instrument Efficiency
 A = Area correction factor, if applicable

11.2 Minimum Detectable Activity (MDA)

The following MDA equation is to be used:

$$MDC = \frac{3 + 3.29 \sqrt{B \cdot t_s \left(1 + \frac{t_s}{t_{bg}} \right)}}{t_s \cdot E \cdot A \cdot SAF}$$

Where:

B = Background count rate, in cpm, of counting instrument
 T_s = Sample count time
 T_{bg} = Background count time
 E = Instrument efficiency
 A = Area correction factor, if applicable
 SAF = Self Absorption Factor

12.0 DOCUMENTATION

1. Survey forms shall be completed in entirety. This includes attaching printouts, diagrams, or other supporting documentation, appending sequential page and survey tracking numbers, a review for completeness and accuracy, and appending the appropriate signatures of personnel performing the survey and/or analyzing samples.
2. Once complete, the survey package shall be submitted to the RSO or designee, for final review and approval signature.
3. Survey documentation shall be maintained according to established RP document control and retention requirements.

13.0 ATTACHMENT

Attachment 1: Acceptable Surface Contamination Levels

Attachment 1
Acceptable Surface Contamination Levels

Radionuclide Groups^{1,2}	Screening Levels³ S.I. Units (Bq/cm² or Bq/g)⁴	Surface Screening Levels³ Conventional Units (dpm/100 cm²)	Volumetric Screening Levels³ Conventional Units (pCi/g)
<u>Group 1</u> Radium, Thorium, and Transuranics: Po-210, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, Np-237, Pu-239, Pu-240, Am-241, Cm-244, and associated decay chains, and others ^{1,5}	0.1	600	3
<u>Group 2</u> Uranium and selected high-dose beta- gamma emitters: Na-22, Mn-54, Co-58, Co-60, Zn-65, Sr-90, Nb-94, Ru-106, Ag-100m, Sb-124, Cs-134, Cs-137, Eu-154, Ir-192, U-234, U-235, U-238, natural uranium, and others ^{1,6}	1	6,000	30
<u>Group 3</u> General beta-gamma emitters: Na-24, Cl-36, Fe-59, Cd-109, I-131, I-129, Ce-144, Au-198, Pu-241, and others ¹	10	60,000	300
<u>Group 4</u> Other beta-gamma emitters: H-3, C-14, P-32, S-35, Ca-45, Cr-51, Fe-55, Ni-63, Sr-89, Tc-99, In-111, I-125, Pm-147, and others ¹	100	600,000	3,000

Notes:

1. To determine the specific group for radionuclides not shown, a comparison of the effective dose factors by exposure pathway (see Table A.1 of National Council on Radiation Protection Measurements [NCRP] Report No. 123) shall be performed and a determination of the proper group made based in similarity of the factors.
2. Radionuclides were assigned to groups that were protective of 10 microsieverts per year (1.0 millirem per year) and were limited to four groups for ease of application per Annex B of ANSI N13.12.
3. Rounded to one significant figure.
4. The screening levels shown are used for either surface activity concentration (Bq/cm²) or volume activity concentration (Bq/g). These groupings were determined based on similarity of the scenario modeling results described in Annex B of ANSI N13.12
5. For decay chains, the screening levels represent the total activity (i.e., activity of the parent plus the activity of all progeny present).
6. Where the natural uranium activity equals 48.9% from U-238, 48.9% from U-234, and 2.25% from U-235.

1.0 PURPOSE

This project procedure describes the method of surveying equipment, materials, or vehicles for release for unrestricted use.

2.0 APPLICABILITY

This project procedure applies to all site personnel responsible for the unrestricted release of equipment and materials used in a Restricted Area. This procedure is not used for vehicles that are transporting radioactive materials.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection against Radiation."
2. EM 385-1-80, "Radiation Protection Manual," United States Army Corps of Engineers (USACE).
3. EFS-RP-04, "Radiological Surveys."

4.0 DEFINITIONS

CPM: Counts per minute.

DPM: Disintegrations per minute.

Equipment and Material: Equipment and material refers to any item used in a Restricted Area to support work activities (i.e., hand tools, heavy equipment, plastic, etc.).

LAW: Large Area Wipe (i.e., Masslinn).

Unrestricted Release: Release of equipment and/or material to the general public. The equipment and/or material is deemed to meet site release criteria for both total and removable contamination.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Ensures adequate staffing, facilities, and equipment are available to perform the survey tasks assigned to Radiation Protection personnel.
- Ensures that surveys take place in appropriately posted areas.
- Reviews results of survey data as required for determining acceptability for release of items.
- Dispositions materials that cannot be released based on survey results.
- Investigates and initiates corrective actions for the improper release of radiologically contaminated material.

5.2 Radiation Protection Technician (RPT)

- Identifies equipment and material to be surveyed for unrestricted release.
- Performs and documents contamination surveys.
- Posts, secures, and controls radioactive material that cannot be released.
- Releases material in accordance with this and implementing procedures.

5.3 Project Personnel

- Adheres to all policies, procedures, and other instructions, verbal and written, regarding control and minimization of radioactive material and contaminated material.
- Reports any concerns about the control and minimization of radioactive material and contaminated material to supervision.
- Maintains good housekeeping at work sites and assists in preventing the build-up and spread of contamination.

6.0 EQUIPMENT AND MATERIAL

1. Alpha Detector.
2. Beta-Gamma Detector.
3. Portable Ratemeter/Scaler.
4. Scintillation or Gas-Flow Proportional Lab Alpha/Beta Counter.
5. Survey forms.
6. Cloth smears.
7. Masslinn™ type cloths.

7.0 PROCEDURE

7.1 General Instructions

Prior to conducting any surveys, ensure that all survey instrumentation has been response checked, is operating within control limits, and has not been removed from service.

- Response checks shall be performed daily.
- Background measurements are to be taken prior to use at the point of use. The background count time shall be greater than or equal to the sample count time.
- Verify that the MDC has been calculated for the background at the point of use and is less than the applicable site release criteria. Refer to RP-16, *Radiological Surveys*, for the MDC calculation.
- Survey results are converted from counts per minute (cpm) to disintegrations per minute (dpm). A sample “cpm to dpm” calculation is attached for review and use at the end of this procedure.

7.2 Release of Items for Unrestricted Use

- Surveys for both total and removable contamination shall be made in accordance with Section 7.3 (below) on all equipment, materials, or vehicles which have either been in a Restricted Area or which may be potentially contaminated.
- With RSO approval, removable contamination surveys may be disregarded, provided that direct survey measurements and instrument MDCs are below site removable contamination limits for release.
- Items which have a potential for internal contamination of inaccessible surfaces shall be evaluated by the RSO, or designee, prior to release.
- All items to be released shall be surveyed in such a manner as to fully demonstrate that accessible surfaces comply with the surface contamination release criteria specified in RP-04, *Radiological Surveys*.

- Items that do not meet release criteria shall be decontaminated until release criteria is met or shall be disposed of as radiological waste.
- To the extent practicable, visible dirt and mud or other material shall be removed from surfaces prior to survey.
- The RSO, or designee, shall review all survey data prior to the release from the Restricted Area.

7.3 Direct Surveys Scans and Static Measurements

- Surfaces shall be dry and cleaned, to the extent practicable, prior to performing direct alpha measurements.
- Alpha detectors should be placed within ¼-inch of the surface to be surveyed. Use caution to not contaminate or damage the detector surface.
- Beta detectors should be placed within ½-inch of the surface to be surveyed. Use caution to not contaminate or damage the detector surface.
- Perform a scanning survey of all accessible surface areas of the item; focus survey measurements on areas most likely to be contaminated.
- Obtain a representative number of static measurements at locations exhibiting the highest scan result and/or with the highest potential for contamination. The number of survey points selected is subjective based on technician experience, an item's use history, and RSO guidance.
- Static measurement count times shall be appropriate for desired MDCs. Typical count times are one minute for digital scalers and until the meter reading stabilizes for analog rate meters.
- Record and identify all locations surveyed on the appropriate survey form(s). The use of diagrams or sketches is recommended.
- All measurements shall be reported in units of "dpm" unless otherwise directed by the RSO. Examples include "dpm/100 cm²" and "dpm/probe."

7.4 Removable Contamination Surveys

- "Cloth" smears shall be used for smear surveys.
- A notation (e.g., smear number, date, time, location, etc.) should be made on the smear envelopes to ensure proper smear tracking. Smears may also be numbered using a pen or marker prior to use.
- Using moderate pressure, swipe an area of 100 cm² (4-inch square area or equivalent) of the surface at the selected location. Smear surveys should be performed at the same location that direct surveys were performed.
- Large Area Wipes (LAW), also commonly referred to by the trade name "Masslinn," may be used to supplement smear surveys for removable contamination. The use of LAWs should be documented on the survey form with the notation "LAW" or equivalent.
- Ensure each used swipe (i.e., smear or large area wipe) is handled, stored, and transferred in such a fashion as to prevent loss of sampled material or cross-contamination with other personnel and other swipe samples.
- Smear samples should be counted using available scintillation or gas-flow proportional laboratory counters when practicable. Field instruments may be used for smear counting at the discretion of the RSO.
- LAW samples may be counted using field instruments. The use of laboratory counters is inappropriate.

- Removable contamination survey results shall be reported in units of “dpm” unless otherwise directed by the RSO. Examples include “dpm/100cm²” and “dpm/LAW.”
- Ensure all results are documented on the appropriate survey form. Lab printouts may be attached and referenced on the survey form.

8.0 CALCULATIONS

MDC and Sample Activity formulas are located in EFS-RP-04, *Radiological Surveys*.

9.0 DOCUMENTATION

1. Surveys shall be documented in accordance with EFS-RP-06, *Survey Documentation and Review*.
2. Survey forms shall be completed in their entirety. This includes attaching printouts, diagrams, or other supporting documentation, appending sequential page and survey tracking numbers, a review for completeness and accuracy, and appending the appropriate signatures of personnel performing the survey and/or analyzing samples.
3. Once complete, the survey package shall be submitted to the RSO, or designee, for final review and approval signature.
4. Survey documentation shall be maintained according to established RP document control and retention requirements.

10.0 ATTACHMENTS

Attachment 1: Acceptable Surface Contamination Levels

Attachment 1
Radiological Contamination Limits for Free Release

Radionuclide Groups^{1,2}	Screening Levels³ S.I. Units (Bq/cm² or Bq/g)⁴	Surface Screening Levels³ Conventional Units (dpm/100 cm²)	Volumetric Screening Levels³ Conventional Units (pCi/g)
<u>Group 1</u> Radium, Thorium, and Transuranics: Po-210, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, Np-237, Pu-239, Pu-240, Am-241, Cm-244, and associated decay chains, and others ^{1,5}	0.1	600	3
<u>Group 2</u> Uranium and selected high-dose beta- gamma emitters: Na-22, Mn-54, Co-58, Co-60, Zn-65, Sr-90, Nb-94, Ru-106, Ag-100m, Sb-124, Cs-134, Cs-137, Eu-154, Ir-192, U-234, U-235, U-238, natural uranium, and others ^{1,6}	1	6,000	30
<u>Group 3</u> General beta-gamma emitters: Na-24, Cl-36, Fe-59, Cd-109, I-131, I-129, Ce-144, Au-198, Pu-241, and others ¹	10	60,000	300
<u>Group 4</u> Other beta-gamma emitters: H-3, C-14, P-32, S-35, Ca-45, Cr-51, Fe-55, Ni-63, Sr-89, Tc-99, In-111, I-125, Pm-147, and others ¹	100	600,000	3,000

Notes:

- To determine the specific group for radionuclides not shown, a comparison of the effective dose factors by exposure pathway (see Table A.1 of National Council on Radiation Protection Measurements [NCRP] Report No. 123) shall be performed and a determination of the proper group made based in similarity of the factors.
- Radionuclides were assigned to groups that were protective of 10 microsieverts per year (1.0 millirem per year) and were limited to four groups for ease of application per Annex B of ANSI N13.12.
- Rounded to one significant figure.
- The screening levels shown are used for either surface activity concentration (Bq/cm²) or volume activity concentration (Bq/g). These groupings were determined based on similarity of the scenario modeling results described in Annex B of ANSI N13.12
- For decay chains, the screening levels represent the total activity (i.e., activity of the parent plus the activity of all progeny present).
- Where the natural uranium activity equals 48.9% from U-238, 48.9% from U-234, and 2.25% from U-235.

1.0 PURPOSE

This procedure establishes consistent methodology for documenting radiological surveys and provides criteria for the review of these surveys at the Harshaw Chemical Company Site (HCCS)

2.0 APPLICABILITY

This procedure is applicable to all radiological surveys excluding air samples.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. EM 385-1-80 "Radiation Protection Manual," United States Army Corps of Engineers (USACE).
3. HCCS "Radiation Protection Plan (RPP)."
4. EFS-RP-04, "Radiological Surveys."

4.0 GENERAL

4.1 Discussion

The results of surveys will be documented on survey forms or in designated logs as approved by the Radiation Safety Officer (RSO). Survey data will contain enough detail to provide personnel with adequate information concerning radiological conditions existing in the area surveyed.

The RSO or designee will review completed survey documentation to ensure appropriate, adequate, and complete information is recorded. The individual reviewing the survey will ensure that the recorded results are legible, in accordance with Radiological Protection Program (RPP) implementing procedures, consistent with anticipated levels, and will determine the reason for any variances.

4.2 Definitions

Airborne Radioactivity Area (ARA): Any area where the measured concentrations of airborne radioactivity above natural background exceed, or are likely to exceed, 25% of the Derived Air Concentration (DAC) values listed in 10 CFR 20, Appendix B, Table I, Column 3.

Contamination Area (CA): Any area accessible to personnel with loose surface contamination values in excess of the values specified in the United States Army Corps of Engineers (USACE) Radiation Protection Manual, "Acceptable Surface Contamination Levels," (also refer to SEC-RP-16, "Radiological Surveys"), or any additional area specified by the RSO. The Contamination Area posting requirement is more restrictive than the Radioactive Material Area posting requirement. Any area posted as a Contamination Area shall also be a Radioactive Materials Area.

Contact Dose Rate: A radiation dose rate as measured at contact or within 1/2 inch of the surface being measured.

General Area Dose Rate (GA Dose Rate): The highest radiation dose rate accessible to any portion of the whole body measured at 30 cm (12 inches) from a significant radiation source or combination of sources.

Radiation Area (RA): Any area, accessible to personnel, where the whole-body dose rate can exceed 5 mrem in 1 hour at 30 cm from the source.

Radiation Work Permit (RWP): Means a document or series of documents prepared by Radiation Protection to inform workers of the radiological conditions which exist in the work area and the radiological requirements for the job.

Radioactive Material: Material activated or contaminated by the operation or remediation activities and by-product material procured and used to support the operations.

Radioactive Materials Area (RMA): Any area or room where quantities of radioactive materials more than 10 times the 10 CFR 20, Appendix C quantities are used or stored, or any area designated by the RSO which does not exceed the site Contamination Area criteria.

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

5.0 RESPONSIBILITIES

5.1 Site Safety and Health Officer (SSHO)

The SSHO is responsible for ensuring all surveys are performed in accordance with the requirements of the Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP).

5.2 Radiation Safety Officer (RSO)

The RSO or designee is responsible for reviewing radiological surveys performed by Radiation Protection Technicians (RPT).

5.3 Radiation Protection Technician (RPT)

RPTs are responsible for documenting surveys in a legible manner on approved forms.

6.0 PREREQUISITES

Surveys for radiation and contamination have been performed in accordance with EFS-RP-04 "Radiological Surveys."

7.0 PRECAUTIONS AND LIMITATIONS

Surveys for airborne radioactivity will be documented in accordance with EFS-RP-07, "Measurement of Airborne Radioactivity."

8.0 APPARATUS

Survey Forms.

9.0 RECORDS

1. HCCS Survey Form (Attachment 1).
2. HCCS Survey Log Number Form (Attachment 2).
3. Radiation Protection Technician (RPT) Logbooks.

10.0 PROCEDURE

The methods outlined in this procedure are intended to assure the clear and concise transfer of survey information. Variations or deviations from the protocols in this procedure are permitted if the clear transfer of information is maintained.

10.1 Documentation

10.1.1 General

- Record all information on survey forms in a neat and legible manner.
- Document all surveys on a form with approved project heading. Technician logbooks may be used for documenting surveys (e.g., daily routines, material transfers, minor posting changes, etc.) as authorized by the RSO and providing instrument serial numbers are documented with survey data.
- When recording information on survey forms, check all appropriate boxes and circle all appropriate answers.
- Use a survey form with pre-drawn diagrams when available. If not, draw a diagram or picture of the object surveyed. Should a diagram not be appropriate, use a lined survey form.
- Assign the next sequential survey number to the survey from the survey number logbook.
- Complete the following information for all surveys:
 - Date and time of survey.
 - Location of survey.
 - Instrument type and serial numbers and associated supporting information (i.e., detector efficiencies, calibration dates, background values, etc.).
 - RWP number, if applicable.
 - Reason for survey.
 - Name and signature of surveyor.
- Indicate Radiological Hazard Area boundaries on the survey form using x's and -'s (-x-x or **).
- Note the posted Radiological Hazard using common designator such as:
 - Contamination Area = CA.
 - Radiation Area = RA.
 - Radioactive Material Area = RMA.
 - Airborne Radioactivity = ARA.
- The use of Greek alphabet and other nuclear industry standard nomenclature (e.g., “k” = 1000) is acceptable when documenting surveys.

10.1.2 Survey Log Number Book

- Survey log number book is to be used to assign a unique sequential number to each survey form package. This number provides the ability to track individual surveys as well as ensuring the submittal of a complete documentation package for archiving.
- Unless otherwise directed by the RSO, survey numbers will be assigned with the following format:

HCCS-YYYY-XXXX

- “HCCS” corresponds to Harshaw Chemical Company Site, “yyyy” corresponds to the year, and xxxx refers to the sequential survey number.
- As surveys are generated, the RPT will take the next sequential number on the form and fill in the remaining boxes with a brief description of the reason for the survey as well as the date and RPT’s initials.

10.1.3 Radiation Surveys

- Indicate Contact dose rates by underlining the radiation level on the Survey Form at the appropriate location (Example: 25 uR/hr).
- Indicate general area (30 cm) dose rates by recording the radiation level with beneath the underlined contact reading on the Survey Form at the appropriate location. Example: 25 uR/hr contact and 10 uR/hr GA should be documented as follows:
 - 25 uR/hr
10 uR/hr
- Use a legend to inform the reviewer of any other notation utilized or if deviating from standard protocol.

10.1.4 Contamination Surveys

- Indicate survey locations by placing sequential numbers within a circle on the Survey Sheet. The Survey Sheet has corresponding direct and transferable columns for both alpha and beta/gamma activity.
- Use a legend to inform the reviewer of any other notation utilized or if deviating from standard protocol.
- The use of the letter “k” to indicate units of a thousand is acceptable.

10.2 Technician Review and Evaluation

- After completing the surveys, evaluate the results against previous surveys or anticipated results.
- Verify that radiological boundaries and postings are correct in accordance with EFS-RP-02, “Radiological Postings.”
- Ensure all relevant supporting documentation (e.g., count room print-outs, etc.) are attached to the survey package and that the package is properly paginated.
- Submit documentation to the RSO or designee for supervisory review.

10.3 Supervisory Review

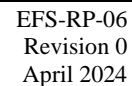
- Ensure that the survey form is complete and legible.
- Ensure that all required information has been completed.
- Ensure that any changes, single line cross-outs, or deletions are initialed and dated at time performed.
- Verify that results are consistent with those anticipated.
- If results are not consistent, ensure that appropriate actions have been taken to explain the results or re-examine the area.
- Sign-off in the appropriate review section of the survey form and submit package to RP Document Control for retention/transmittal to Project Files.

11.0 ATTACHMENTS

Note: Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachments.

Attachment 1: HCCS Survey Form (Typical)

Attachment 2: HCCS Survey Log Number Form (Typical)



1.0 PURPOSE

This procedure establishes the basis and methodology for the placement and use of air monitoring equipment, as well as the collection, analysis, and documentation of air samples. Radiological air sampling and analysis is performed to monitor concentrations of radionuclides in the air for purposes of tracking internal radiation exposure to occupational radiation workers, determining appropriate respiratory protection devices, establishing radiological posting boundaries, verifying effluent airborne radioactivity concentrations, and providing information on radiological conditions in the work area.

2.0 APPLICABILITY

This procedure applies to radiological air monitoring activities performed in support of Harshaw Chemical Company Site (HCCS) activities.

3.0 REFERENCES AND DEFINITIONS

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. HCCS, "Radiation Protection Plan (RPP)"
3. Rock, R.L., *Sampling Mine Atmospheres for Potential Alpha Energy Due to the Presence of Radon-220 (Thoron) Daughters*, Informational Report No. 1015, United States Department of the Interior, Mining Enforcement and Safety Administration, 1975.
4. Kusnetz, H.L., Radon Daughters in Mine Atmospheres, A Field Method for Determining Concentrations, Am. Ind. Hyg. Assoc. Quat., Vol. 17, No. 87, 1956.
5. ANSI N13.1, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.
6. Regulatory Guide 8.25, Air Sampling in the Workplace.
7. EM 385-1-80, United States Army Corp of Engineers (USACE) Radiation Protection Manual.
8. EM 385-1-1, United States Army Corp of Engineers (USACE) "Safety and Health Requirements Manual."
9. 29 CFR 1910.1096, United States Occupational Health & Safety, Ionizing Radiation.

4.0 DEFINITIONS

Airborne Radioactivity: Radioactive material in any chemical or physical form that is dissolved, misted, suspended, or otherwise entrained in air.

Ambient Air: Air in the volume of interest, such as room atmosphere, as distinct from a specific stream or volume of air that may have different properties.

Annual Limit on Intake (ALI): The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent (CEDE) of 5 rems or a committed dose equivalent (CDE) of 50 rems to any organ or tissue.

Breathing Zone (BZ): A uniform description of the volume of air around the worker's upper body and head which may be drawn into the lungs during the course of breathing.

Committed Dose Equivalent (CDE): The dose equivalent to tissues or organs of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

Committed Effective Dose Equivalent (CEDE): The sum of committed dose equivalents (CDEs) to various tissues in the body, each multiplied by the appropriate weighting factors found in 10 CFR 20.

Derived Air Concentration (DAC): The concentration of a given radioactive nuclide in air which, if breathed by the reference man for a working year of 2000 hours under conditions of light work (1.2 m^3 of air per hour), would result in an intake of one (1) ALI.

DAC-hour (DAC-hr): The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the DAC for each radionuclide) and the time of exposure to that radionuclide in hours. A facility may take 2000 DAC-hr to represent 1 ALI.

Grab Sample: A single sample of ambient air collected over a short time.

Maximum Permissible Concentration (MPC): That concentration of radionuclides in air or water that will result in the Maximum Permissible Body Burden or Organ Burden and result in a whole body or organ receiving the annual dose limit if breathed in by a worker for 2000 hours.

Monitoring: The measurement of radiation levels, airborne radioactivity concentrations, radioactive contamination levels, quantities of radioactive material, or individual doses and the use of the results of these measurements to evaluate radiological hazards or potential and actual doses resulting from exposures to ionizing radiation.

MPC-hour (MPC-hr): The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the MPC for each radionuclide) and the time of exposure to that radionuclide in hours.

Occupational Dose: An individual's ionizing radiation dose (external and internal) received as a result of that individual's work assignment.

Protection Factor: The degree of protection given by a respirator. The protection factor is used to estimate radioactive material concentrations inhaled by the wearer and is expressed as the ratio of ambient concentration of airborne radioactive materials to the concentration that can be maintained inside the respirator during use.

Representative: Sampling in such a manner that the sample closely approximates both the amount of activity and the physical and chemical properties of the material (e.g., particle size and solubility in the case of aerosol to which workers are exposed). Air sampling performed within the Breathing Zone (BZ) is considered representative of the airborne radioactive material concentration inhaled by the worker.

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

5.0 RESPONSIBILITIES

5.1 Site Safety and Health Officer (SSHO)

Ensures all activities performed within this procedure conform to the requirements of the SSHP.

5.2 Radiation Safety Officer (RSO)

- Manages the implementation of this procedure.
- Ensures technicians performing activities under this procedure are competent and have sufficient experience to perform assigned tasks.

5.3 Radiation Protection Technician (RPT)

- Initiates, collects, submits, counts, and documents air samples according to the requirements of this procedure, and the SSHP.
- Ensures he / she has sufficient experience and / or knowledge to perform assigned duties under this procedure.

6.0 PRECAUTIONS AND LIMITATIONS

1. Running air samplers for extended periods may cause excessive dust loading of the filter media. The frequency of filter change-out should be increased if excessive dust loading is observed.
2. Air samplers shall not be used in combustible / explosive atmospheres.
3. Air sampling and sample counting equipment shall not be operated beyond their respective calibration periods.
4. Air samples shall be taken in such a manner as to not contaminate the filter with materials that were not airborne during the sample interval or by re-suspension of loose contamination from surfaces near the sampling head.
5. Sampler exhaust may cause the re-suspension of loose surface contamination if the sampler is positioned improperly.
6. Consider higher volume air samplers when covering short duration tasks.
7. The decision to provide individual monitoring devices to workers is influenced by the expected levels of intake, likely variations in dose among workers, and the complexity of measurement and interpretation of results.

7.0 ACTION STEPS

7.1 Air Monitoring Methods

Utilize the following monitoring methods to implement the radiological air monitoring program:

- General Area (GA) Air Monitoring
- Breathing Zone (BZ) Air Monitoring
- Passive Radon Monitoring
- Particulate Radon Grab Samples
- Perimeter Monitoring, frequently referred to as Air Environmental (AE)
- Air sampling equipment should be placed to:
 - Not directly contact a contaminated (transferable) surface.
 - Minimize interference with the performance of work.
 - Be easily accessible for changing filters and servicing.
 - Be downstream of potential release points.
 - Minimize the influence of supply airflow.
- An airflow study of any indoor area to be monitored should be performed prior to placement of the sampler (other than BZ samplers). Additional studies should be performed after changes in

the work area setup, ventilation systems, or seasons, if seasonal changes may affect airflow patterns.

- Perform BZ air sampling in occupied areas where, under typical conditions, a worker is likely to be exposed to an air concentration of 10 % or more of the DAC.

7.2 General Area (GA) Air Sampling

- GA samples are typically taken with low volume samplers such as F&J Model LV-1 or equivalent.
- GA sampling shall be performed with instrumentation operating at volumes capable of meeting the Minimum Detectable Concentration (MDC) values.
- GA samples should be collected:
 - During work activities as a supplement to Breathing Zone (BZ) sampling as deemed appropriate.
 - At site boundaries to confirm effluent air discharge concentrations
 - At discharge points to determine the worst case airborne radiological conditions.
- Document airflow studies, if performed in the appropriate project logbook or as directed by the RSO.
- Select a calibrated low / high volume sampler with the appropriate glass fiber air filter and place the sample head into position. The fuzzy side of the filter should face outwards.
- Turn the sampler ON. At a minimum, document the following information on the air filter envelope or log sheet:
 - Sampling station identifier (as determined by the RSO)
 - Sampler model
 - Serial number
 - Date / time on
 - Flow rate
 - On by (individual starting sampler)
- When air monitoring is complete, observe the sampler flow rate and turn the sampler off. At a minimum, document the following information on the air filter envelope or logsheet:
 - Date / time off
 - Flow rate
 - Off by (individual terminating sample)
- Remove and / or replace the sample head and filter using caution to prevent cross-contamination.
- Store the filter in a protective container to minimize the loss of collected material.
- Submit sample to counting lab for analysis.

7.3 Breathing Zone (BZ)

- Collect BZ samples during entries into posted airborne radioactivity areas and during activities which have a reasonable potential of producing airborne radioactivity (e.g., excavating contaminated soils, surface destructive activities on surfaces with fixed contamination) as determined by the RSO.
- Position the sampler on the individual representative of the worst-case exposure for the group if a single lapel sampler is used for multiple members of a work group. Base this selection on

operating experience and consultation with the RSO. A single lapel sampler should be used for a group of no more than four workers spending greater than one hour in the work area under the same RWP.

- Ensure the sample head is positioned as close to the breathing zone as practical without interfering with the work or the worker.
- Operate lapel samplers according to the appropriate instrument use procedure. At a minimum, document the following information on the air filter envelope or log sheet:
 - Wearer's name(s)
 - Applicable Radiation Work Permit (RWP) number
 - Sampler model / serial numbers
 - Date / time On
 - Flow rate (sampler must be running)
 - On by (individual starting sampler)
- Upon exit from the work area, note the flow rate, turn the sampler OFF and detach from the worker / object. Note that sampling may be suspended / restarted during the workday to facilitate break periods. Accurate volume tracking is crucial during these periods of non-operation.
- Perform necessary post-operation sampler checks according to the specific instrument use procedure.
- Carefully, remove the air filter from the sample head and place in air filter envelope. Complete the pre-printed air filter envelope or sample log sheet:
 - Date / time off
 - Flow rate
 - Off by (individual stopping sampler)
- Submit sample to Counting Room for analysis.

7.4 Radon and Thoron Progeny

High volume or low volume grab samplers such as F&J Model HV-1, LV-1, or RAS-1 (typically in the 35-75 lpm range) should be used for collecting radon and thoron samples.

Radon and thoron samples should be collected:

- During work activities as deemed appropriate by the RSO or designee.
 - At restricted area boundaries as deemed appropriate by the RSO or designee.
 - Each frequently occupied work location should have its own samplers.
 - Airflow patterns should be considered in placing samplers so that the sampler is likely to be in the airflow downstream of the source.
 - A simultaneous background sample shall be taken upwind of all activities when radon and thoron sampling is performed. This sample is critically important.
 - When collecting a radon and thoron breathing zone sample, the sampler should be located in the breathing zone for the worker. Preferably it should be held immediately downwind of the worker and moved around with the worker.
- Select a calibrated high volume sampler with a 47 mm filter and place the sample head into position. The preferred filter is a membrane filter such as the F&J Specialty Products, Inc. model

number A020A047A or equivalent. Alternatively, a glass fiber filter such as the F&J Specialty Products, Inc. model number AE-47 or equivalent can be used.

- Turn the sampler ON and complete the required information on the air filter envelope to include:
 - RWP number, if appropriate
 - Sampler model and serial number
 - On date, time, and flow rate
 - On by (site worker initials)
 - Sample location
- Collect a sample for exactly 5 minutes, with no more than a 5-second uncertainty. Exercise caution when handling sample head so as not to cross-contaminate the air filter.
- Remove air filter from sample head and place in air filter envelope. Complete the required information on the air filter envelope including:
 - Off date, time, and flow rate.
 - Site worker stopping the sampler.
- Submit the sample to the counting room within 30 minutes after collection. Samples must be counted between 40 and 90 minutes, or they will be void.
- Analyze the sample in accordance with Sections 8.1 or 8.2, whichever is appropriate.
- Alternate industry-accepted methods for Radon-Thoron monitoring may be used at the discretion of the RSO with concurrence from the Project Certified Health Physicist.

7.5 Perimeter Air (PA) Sampling

- Perimeter samples are taken with low volume samplers such as Hi-Q PSU-2 or equivalent.
- Perimeter samples are collected to verify compliance with off-site release criteria.
- Samples are collected at locations designated by the RSO. The air sampling locations should be established at the most likely downwind perimeter boundary, as determined by evaluation of local meteorological data, and / or the nearest perimeter boundary from active work areas.
- Perimeter samplers should be operated 24 hours a day 7 days a week if possible.
- Filters from continuously operating perimeter air samplers are normally changed out weekly. Filter change-out of perimeter air samplers will be performed at a frequency long enough to ensure acceptable counting statistics and short enough to maintain consistent sampler flow rates.
- Perimeter sampler operation shall be verified on a daily basis around locations when airborne generating activities are in progress. This requirement may be relaxed by the RSO for samplers with data logging capability.
- Document daily verification (i.e., flow rate) and notify the RSO of any discrepancies. Replace filter and investigate pump operation if daily flow rates vary by greater than 20%.
- Any sampler that is out of service due to malfunction for more than 1 hour and any invalid samples should be brought to the attention of the RSO.
- Samples are to be collected in accordance with Section 7.2, Steps 5-10.

7.6 Passive Radon Monitoring

- Passive radon monitoring methods include the use of either alpha track-etch detectors or electrets.
 - Detectors should be placed for a length of time, so that the minimum detectable concentration is 0.1 pCi/l or less, following manufacturer guidelines. The length of placement is generally 1 month or greater. Locations selected should be representative of the breathing zone, when practical. A simultaneous background sample should always be taken at a location unaffected by site activities. This sample is critically important.
 - Open the bag containing the detector and place the detector in a protective container to allow for air circulation. Follow manufacturer guidelines to activate the detector, as necessary.
 - Record in the logbook:
 - Sample location
 - Date and time of placement
 - Serial number of the detector
 - Initials of the worker placing the detectors
5. Ship the detector to the manufacturers processing center to read the results.

8.0 ANALYSIS OF AIR SAMPLES

General Area (GA), Breathing Zone (BZ), and Perimeter Air (AE) samples should be submitted to a counting room or off-site laboratory for gross alpha/beta analysis. Samples may be sent to an outside laboratory for isotopic analysis as necessary per the RSO.

1. Ensure the analytical count times are sufficient to achieve the required minimum detectable concentration (MDC). Calculate the MDC of the counting instrument as follows:

$$\text{MDC} = \frac{3 + 3.29 \sqrt{B \cdot t_s \left(1 + \frac{t_s}{t_{bg}}\right)}}{t_s \cdot E \cdot V \cdot 2.22\text{E}6 \cdot \text{SAF} \cdot \text{CE} \cdot K}$$

Where:

MDC	=	minimum Detectable Concentration in $\mu\text{Ci/ml}$
B	=	background count rate, in cpm, of counting instrument
t_s	=	length of time, in minutes, that the sample was counted
t_{bg}	=	length of time, in minutes, that the background was counted
V	=	volume of air in ml
2.22E6	=	converts dpm to uCi
E	=	efficiency of counting instrument
CE	=	filter collection efficiency (normally 0.998)
SAF	=	self absorption factor
K	=	other modifying factors and unit conversions

Note:

The MDC should be less than 2% of the DAC value for the isotope of interest. Count the sample on a calibrated instrument capable of detecting the isotope of interest. The count time should be such that the MDC is less than or equal to 2% of the DAC value.

2. Calculate the airborne concentration of the sample as follows:

$$\text{Conc.} = \frac{\text{cpm}_{\text{net}}}{E \cdot V \cdot 2.22\text{E}6 \cdot \text{SAF} \cdot \text{CE} \cdot K}$$

Where:

- Conc. = airborne radioactivity concentration of sample in uCi/ml
 cpm_{net} = (gross counts/count time) - background cpm of counting instrument
V = volume of air in liters
E = efficiency of counting instrument
2.22E6 = converts dpm to uCi
CE = filter collection efficiency (normally 0.998)
SAF = alpha self absorption correction factor
K = other modifying factors and unit conversions

8.1 Analysis for Radon and Thoron Progeny from a 5-Minute Low Volume Grab Sample

- 8.1.1 Count the sample twice for alpha activity using a Ludlum 2929, Ludlum 3030, or Equivalent. The first count should start at least 40 minutes after the end of the sample, but not greater than 90 minutes at the end of sample collection. The second count should start at least 5 hours after the end of the count, but not greater than 17 hours after the end of the first count. Count the sample for 5 minutes each time.

NOTE: It is not recommended that a gas flow proportional counter be used for this analysis as there is a reasonably high probability of contaminating the instrument with radon and / or thoron progeny.

- 8.1.2 Calculate the thoron progeny (TDC) in working levels from the delayed (second) count as follows:

$$\text{TDC} = \frac{\text{cpm}_{\text{net}}}{E \cdot V \cdot \text{CE} \cdot \text{SAF} \cdot F_{\text{Th}}}$$

Where:

- cpm_{net} = (gross counts/count time) - background cpm of counting instrument
V = volume of air in liters
E = efficiency of counting instrument
CE = filter collection efficiency (normally 0.998)
SAF = self absorption factor (normally 0.7 for glass fiber filters and 1.0 for membrane filters)
 F_{Th} = working level factor from Graph 1 (Attachment 1).

- 8.1.3 Calculate the radon progeny (RDC) in working levels from the first count as follows:

$$RDC = \frac{\left(\frac{cpm_{net}}{E \cdot V \cdot CE \cdot SAF} - TDC \times 16.5 \right)}{F_{Rn}}$$

Where,

- cpm_{net} = (gross counts/count time) - background cpm of counting instrument
V = volume of air in liters
E = efficiency of counting instrument
CE = filter collection efficiency (normally 0.998)
SAF = self absorption factor (normally 0.7 for glass fiber filters and 1.0 for membrane filters)
 F_{Rn} = radon working level factor from Graph 2 (Attachment 2).
TDC = thoron progeny determined from second count.

8.2 Alternate Method for the Analysis of Radon Progeny from a 5-Minute Low Volume Grab Sample

This section only applies to the determination of radon and not the determination of thoron.

- 8.2.1 Count the sample once for alpha activity using a Ludlum 2929, Ludlum 3030, or Equivalent. The count should start at least 40 minutes after the end of the sample, but not greater than 90 minutes at the end of the count. Count the sample for 5 minutes.

NOTE: It is not recommended to use a gas flow proportional counter for this analysis as there is a reasonably high probability of contaminating the instrument with radon and / or thoron progeny.

- 8.2.2 Calculate the radon progeny (RDC) in working levels from the first count as follows:

$$RDC = \frac{cpm_{net}}{E \cdot V \cdot CE \cdot SAF \cdot F_{Rn}}$$

Where,

- cpm_{net} = (gross counts/count time) - background cpm of counting instrument
V = volume of air in liters
E = efficiency of counting instrument
CE = filter collection efficiency (normally 0.998)
SAF = self absorption factor (normally 0.7 for glass fiber filters and 1.0 for membrane filters)
 F_{Rn} = radon working level factor from Graph 2 (Attachment 2).

9.0 REPORTS

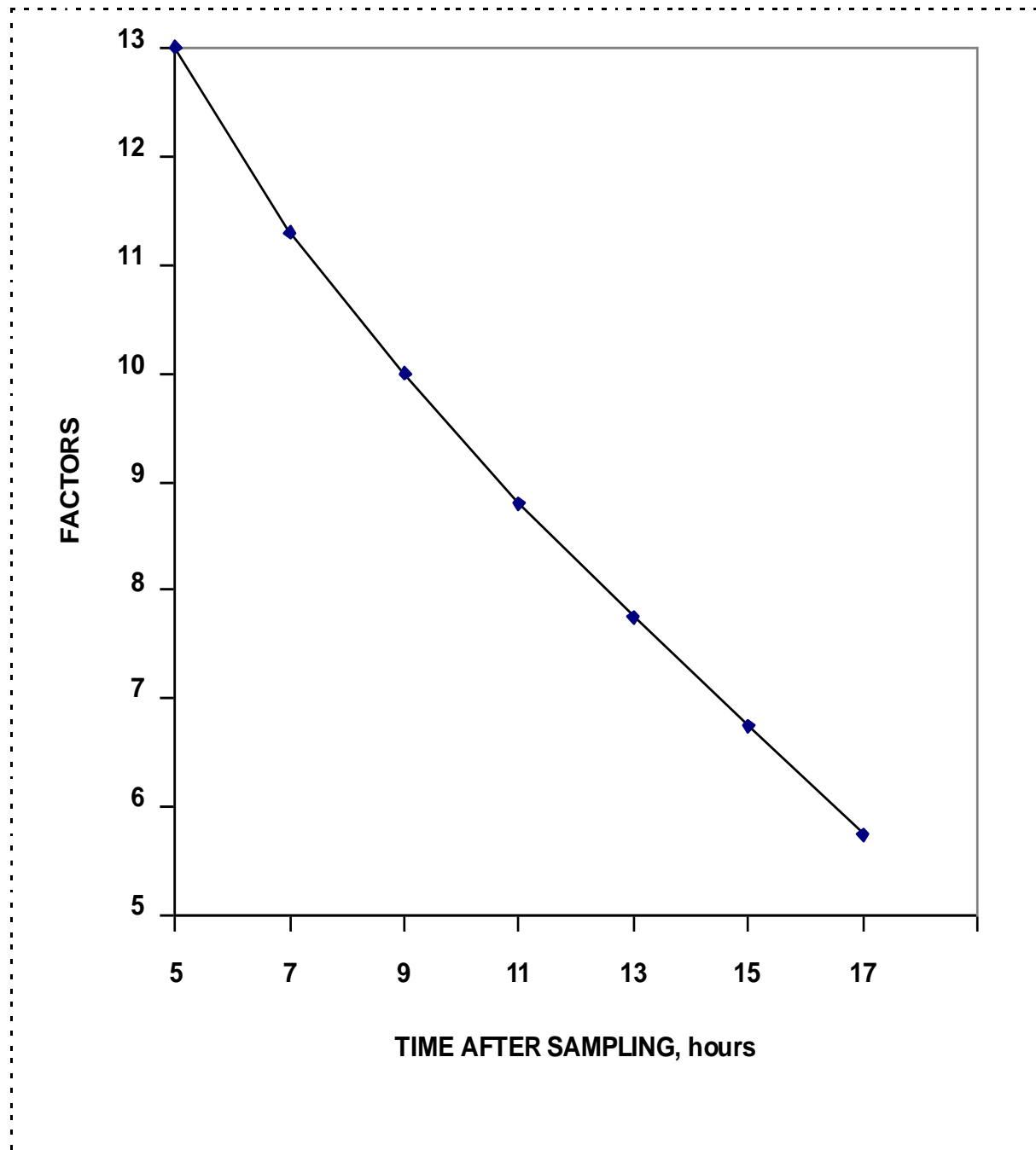
Maintain air monitoring instrument data, sampling data, and analysis results as a quality record.

10.0 ATTACHMENTS

Attachment 1: Graph 1, Thoron Working Level Factors

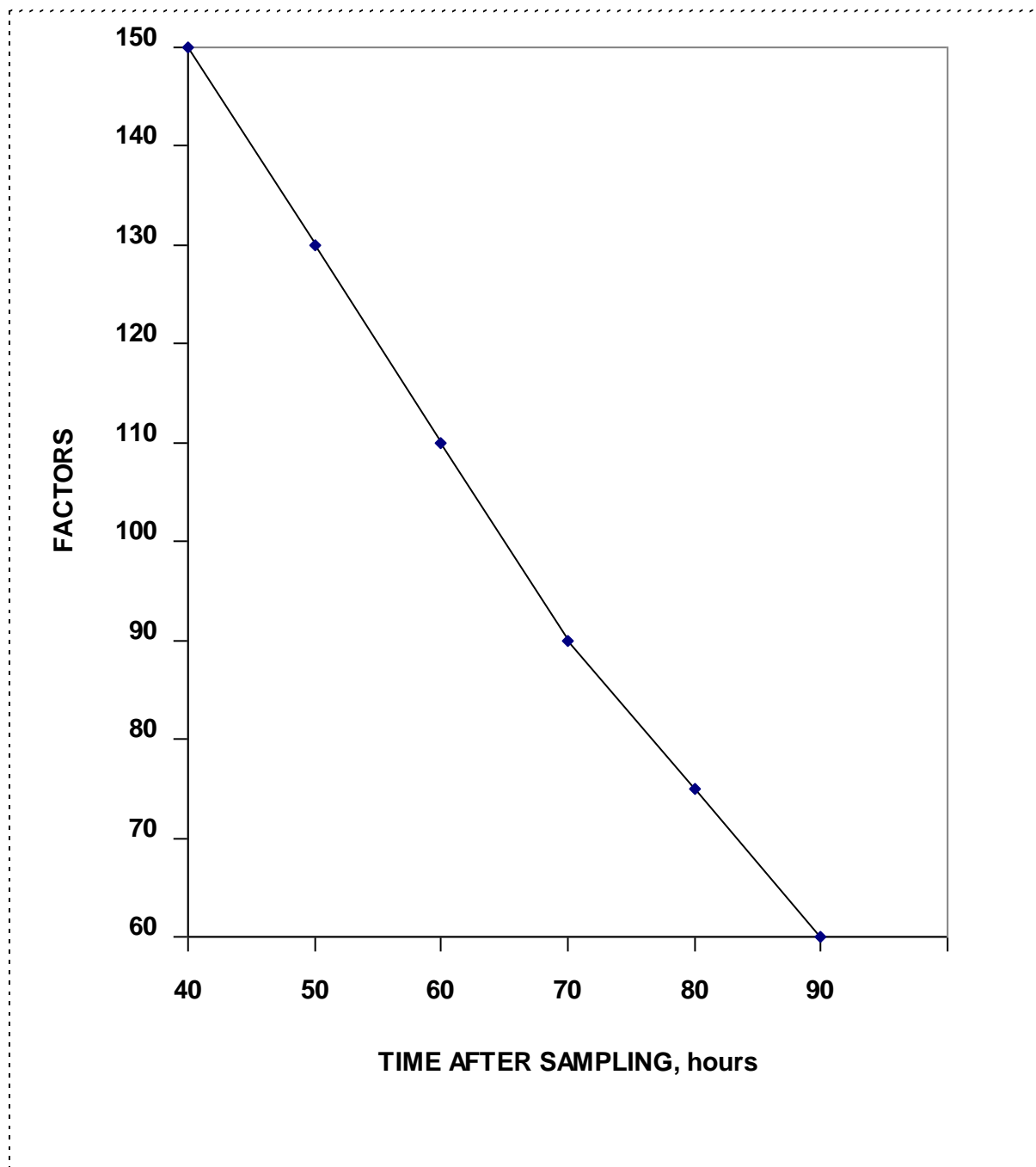
Attachment 2: Graph 2, Radon Working Level Factors

Attachment 1
Graph 1, Thoron Working Level Factors



Time factors versus time after sampling for thoron daughter samples.

Attachment 2
Graph 2, Radcon Working Level Factors



Time factors versus time after sampling for radon daughter samples

1.0 PURPOSE

This procedure provides consistent methodology for set-up, daily pre-operational check, and operation of portable count-rate survey instruments. These instruments are used for the detection of radioactivity on personnel, on or within material surfaces, and in the environment.

2.0 APPLICABILITY

This procedure specifically addresses those meter-probe combinations that report values in units of counts or counts per minute (cpm) such as Ludlum Measurements (LM) Models 12, 2221, 2241, and 2360 Scaler-Ratemeters; and the Ludlum Model 177 Alarming Ratemeter or equivalent. These meters are mated to probes including the Ludlum Model 44-10, 44-20, and 44-62 NaI Detectors, the Ludlum Model 43-5, 43-89, 43-93 scintillation detectors, and the Ludlum Model 44-9 Geiger-Mueller detectors or equivalent. Additional equivalent meters and probes may be used under this procedure without revision as approved by the RSO.

3.0 REFERENCES

1. ANSI N323A-1997, Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments.
2. Instrument Technical Manuals.
3. HCCS Radiation Protection Plan (RPP)
4. EFS-RP-04, Radiological Surveys

4.0 DEFINITIONS

cpm: counts per minute

DFSCL: Daily Field Source Check Logsheet.

dpm: disintegrations per minute

HV: High Voltage

MDC: Minimum Detectable Concentration

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Reviewing and approving changes to this procedure and ensuring compliance with applicable regulations.
- Ensuring an adequate inventory of Radiation Protection instruments are available to support remediation activities.
- Overseeing the issue, control, and accountability of Radiation Protection instrumentation per the requirements of this procedure.
- Ensuring transmittal of all issue, control and accountability records to the appropriate document control authority when applicable.

5.2 Radiation Protection Technician (RPT)

- Maintaining instrument documentation and records as required by this procedure.
- Maintaining adequate instrument and equipment availability.
- Verifying current calibration and response test dates prior to issue or use of instruments.
- Promptly returning instruments to their proper location when work is complete.
- Ensuring that instruments are properly surveyed for contamination and decontaminated as necessary after use.

6.0 PREREQUISITES

- Only personnel with appropriate training shall issue or use RP instrumentation.
- Instruments and detectors shall be inspected for mechanical damage, and response tested prior to issue.
- Any instrument to be used shall have a current calibration label affixed to the instrument.

7.0 PRECAUTIONS AND LIMITATIONS

- Portable count rate survey instruments are susceptible to damage from physical and environmental stresses.
- QA/QC requirements established by an approved survey plan (e.g., HCCS Final Status Survey Plan) supersede the requirements of this procedure.

8.0 APPARATUS

- Appropriate survey instruments.

9.0 RECORDS

- Portable Instrument Set-Up Sheet.
- Daily Field Source Check Logsheet.

10.0 PROCEDURE

10.1 General

1. Ensure the meter-probe combination selected is within their acceptable calibration periods. The swapping of probes between meters is permitted, but not encouraged. The following precautions and limitations must be observed, and the following action steps must be taken:
 - If the meter-probe combination is calibrated as a set, Probe swapping is not permitted, without specific RSO approval.
 - The HIGH VOLTAGE (HV) and THRESHOLD settings for the meter-probe combination shall be within +/- 5v of the calibrated settings. Note that the Ludlum 177 and 2241 do not have user adjustable settings for HV and THRESHOLD.
 - An initial set-up must be performed for each meter-probe combination prior to field use.

- A source with known pedigree must be counted to verify the efficiency is within 20% of the calibrated efficiency, as applicable.
2. The RP Group will coordinate the calibration of meters and probes on a minimum annual basis and after major repair operations. Minor repairs such as battery, cable, and/or mylar window change-outs do not require re-calibration but do require completion of a satisfactory pre-operational check prior to returning to service. Calibration procedures are outside of the scope of this instruction.
 3. Pre-operational checks are required daily prior to use. Post-operational checks are performed as specified in work plans or procedures. Instruments used in the performance of daily activities do not normally require a post-operational check.
 4. Instruments that fail operational checks or malfunction during use should be tagged or labeled “Out-of-Service” or “Do Not Use” and segregated from operational instruments. If possible, describe the problem on the tag / label and add initials and date.
 5. Instruments leaving RP Group control (i.e., repair, calibration, excess, etc.) shall be surveyed for unconditional release according to the contamination criteria established in Table 7-1 of the Site RPP. The repair / calibration center may request a copy of the survey accompany any shipments of RP instruments.
 6. Ensure meters with a “WINDOW” or “WIN” setting are set to “OUT.”
 7. Instruments may be operated in the FAST response mode if necessary. This setting is recommended if the audible response cannot be heard. SLOW response shall be used when performing instrument set-up and operational checks.
 8. Ludlum NaI crystals are located in the end of the probe opposite of the cable connection. Use this end for surveys.
 9. Calibration stickers are attached to the instruments and detectors. Illegible stickers should be replaced prior to instrument use.
 10. Instrument set-up and subsequent operational checks should be performed in the same location, with consistent temperature and background radiation levels.
 11. Source positioning devices (i.e., jigs) may be used to ensure a reproducible geometry between instrument checks. Source geometry must be consistent between initial instrument set-up and subsequent operational checks.
 12. Instruments that do not have scaler capability should be set-up and checked by replacing 1-minute timed counts with static count rate measurements. Each static measurement should last until the meter reading fully stabilizes.

10.2 Instrument Set-Up

1. Inspect the meter-probe combination for physical damage or defect.
2. Complete Section A of the Portable Instrument Set-Up Sheet (Attachment 1).
3. Perform a minimum of ten 1-minute source counts alternating with ten 1-minute background counts. Remove / replace the source and reposition the probe after each count. During alternating background counts, ensure that the source is sufficiently shielded so as not to impact background values.

NOTE: Counts (Source and Background) performed with a Ludlum 43-93, or other large surface area probe, should be alternated between the Heel, Center, and Toe Positions, if the source surface is smaller than the active surface area of the probe. Instrument response can vary greatly across the probe surface.

4. Document each count on the Portable Instrument Set-Up Sheet.
5. Calculate and record the net count value by subtracting the corresponding background count from each source count.

NOTE: Determining Sigma (Standard Deviation) values is useful when specific plans or activities require higher data quality objectives and / or when the development of control charts is necessary.

6. Calculate and record the following values from the obtained background counts:
 - Avg. Value (Sum of values / # of counts).
 - Sigma Value (Standard Deviation of all counts).
 - 20% Value (Avg. Value * 0.20).
7. Obtain a blank Daily Field Source Check Logsheet (DFSCL) (Attachment 2) and transfer the instrument, source, and acceptable range data, as applicable, from the Portable Instrument Set-Up Sheet.
8. Place the DFSCL in the designated use location and forward the completed Portable Instrument Set-Up Sheet and submit to the RSO, or designee for review.
9. Ensure sources are stored properly after use in the designated source storage location.

10.3 Operational Check

1. Obtain the selected meter-probe combination and corresponding DFSCL (Attachment 2).
2. Record the date and time on the DFSCL.
3. Perform and document the following checks on the DFSCL, as applicable:
 - Perform a physical inspection. Observe any instrument damage. Alpha probes should be checked for damage (light leaks) by inverting the probe face towards a light source and observing instrument response. If the instrument fails to respond at all or over-responds this may be an indication of a light leak and should be investigated further, prior to proceeding.
 - Perform a battery check. Instrument Models differ in method. Some meters have a visible battery range on the meter face. The Ludlum Model 2221 has a BAT button that brings up the battery level in the digital display. Ensure this value is at least 5.0v. Change batteries and retest as necessary.
 - Verify and adjust the HV, when possible, to match the initial set-up data. Minute differences in HV (+/- 5v) are acceptable without adjustment.
 - Perform an audio response check.
4. Perform and record a 1-minute background count. Report any abnormal background responses to the RSO, prior to instrument use. Normally acceptable background levels < 5 cpm for alpha probes, and < 300 cpm for Pancake G-M probes. Acceptable background levels for NaI probes are variable due to crystal size.

5. Perform and record a 1-minute source gross count using the same source and geometry applied during initial set-up.
6. Calculate and record the net count value.
7. Compare the net count value to the acceptable range. If the instrument response is outside the acceptable range, investigate the potential cause of the problem. This process may be repeated a maximum of 1 additional time before placing the instrument out-of-service.
8. If the instrument fails the pre-operational checks, mark FAIL, initial the DFSCS, and place the instrument out-of-service. Deliver completed DFSCS to the RSO or designee and explain the failed condition(s).
9. If all checks pass, mark PASS, initial the DFSCS, and return form to designated in-use storage location. This may be a binder, folder, or cabinet. The instrument is now ready for use.
10. If the instrument is used for routine personnel exit monitoring, ensure the alarm threshold is set to alarm and actuates at a level below the site removable contamination limits identified in Table 7-1 of the HCCS RPP. Make adjustments as necessary.
11. Ensure sources are stored properly after use in the designated source storage location.

10.4 Operations

1. Operate the instrument in a manner that minimizes the potential for cross-contamination and physical damage.
2. Evaluate the surface or area to be surveyed for potential scanning interferences. For example, thin layers of water or soil can prevent the detection of alpha contamination. Another example is the use of a NaI probe to qualify soil contamination. The presence of standing water can have a significant impact on instrument response. Initiate necessary corrective actions prior to survey or note conditions during survey reporting.
3. Most instruments will operate in temperatures between 10 and 120 degrees Fahrenheit. However, anytime the temperature is outside of the 32 degree (freezing) or 100 degrees ranges, observe the following precautions:
 - Use particular caution with NaI crystals that may shatter under extreme temperature changes. If the temperature difference is greater than 30 degrees between storage and usage locations, wrap the probe tightly in a cloth towel or other insulator and allow warming or cooling over at least one hour prior to use.
 - Periodically check the instrument against a known source of radiation or contamination. If the instrument appears to be responding incorrectly contact the RSO or designee for guidance.
 - Contact the RSO for guidance anytime work is planned outside of the 10 to 120 degree range.
4. Protect instruments to the extent possible from exposure to moisture (i.e., rain, snow, etc.) during use. Instruments shall be stored in a safe manner when not in use.
5. Minimum Detectable Activities (MDC) for each survey should be determined by evaluating field background levels, not background values obtained during operational checks. Calculate MDC using the formula provided in EFS-RP-04, "Radiological Surveys."

6. Determining activity in disintegrations per minute (dpm) should be performed using the instrument efficiency obtained during calibration. Efficiencies are normally not established for NaI probes, and therefore should not be used for quantifying activity concentrations. The use of NaI probes for activity quantification shall be evaluated by the RSO prior to performance.
7. Observe the following when performing survey scans and static measurements:
 - Alpha probes should be held within ¼-inch of the surface being surveyed. Probe speed should not exceed 1 probe width per second.
 - Beta probes should be held within ½-inch of the surface being surveyed. Survey speed should not exceed one probe width per second.
 - NaI probes should be held at approximately 4-inches above the surface being surveyed. Note that the crystal is located in the probe end opposite the cable connection. Use appropriate sleeving or wrapping in wet or dirty environments.
 - The scan speed for performing Gamma Walkover Surveys is approximately 0.5 m/sec. Move the detector side to side using a 1-meter path length. Each side-side movement should take 2 seconds to traverse the 1-meter path. Advance the probe forward as you go at a rate of approximately 0.5 m/sec. Use the audio function. When increased counts are detected, slow down and locate the source as would be done in a normal survey. Walk parallel paths to ensure that 100% of the area is surveyed. Ensure that the survey extends to the boundaries of the survey unit. Pay particular attention to low lying areas, ditches, and points of possible contamination.
 - Static measurements should be performed as required by procedural guidance (e.g. unconditional release of equipment)
 - All static measurements should be at least 1 minute if the instrument has a scaler function. If the instrument is a ratemeter only, static measurements should last until the meter reading has fully stabilized.
8. Perform a post-operational check after use if directed by work plans, other procedures, or the RSO.

11.0 ATTACHMENTS

Note: Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachments.

Attachment 1: Portable Instrument Set-Up Sheet (Typical)

Attachment 2: Daily Field Source Check Logsheet (Typical)

Attachment 1
Portable Instrument Set-Up Sheet (Typical)

PORTABLE INSTRUMENT SET-UP SHEET

Set-Up Location: _____

INSTRUMENT DATA			COUNT (n)	Source Counts	Source Count Time (min)	Source CPM	Background Counts	Background Count Time (min)	Background CPM	NET CPM
	INSTRUMENT	DETECTOR	1							
MODEL										
SERIAL #			2							
CAL DUE										
HV			3							
THRESHOLD										
SOURCE DATA			4							
ISOTOPE			5							
			6							
SERIAL #			7							
ACTIVITY (uCi)			8							
			9							
ACTIVITY (dpm)			10							
REMARKS				CALCULATED VALUES			ACCEPTABLE RANGES			
				Background (CPM)		Net CPM	Background (CPM)		Net CPM	
					Average			+ 20 %		
								+ 3 Sigma		
					+/- Sigma			+ 2 Sigma		
								+ 1 Sigma		
								- 1 Sigma		
					+/- 20 %			- 2 Sigma		
								- 3 Sigma		
Performed By:				Date / Time:		Reviewed By:		Date / Time:		

Attachment 2
Daily Field Source Check Logsheet (Typical)

DAILY FIELD SOURCE CHECK LOG

MONTH / YEAR: _____

INSTRUMENT DATA			Date/Time	Physical	Battery	High Voltage	Audio	Background CPM {A}	Source CPM {B}	Net CPM {C}	PASS or FAIL	Tech. Initials
	INSTRUMENT	DETECTOR										
MODEL												
SERIAL #												
CAL DUE												
SOURCE DATA												
ISOTOPE												
SERIAL #												
ACTIVITY dpm												
INSTRUMENT RANGES												
	Background	Net CPM										
+ 20 %												
+ 3 Sigma												
+ 2 Sigma												
+ 1 Sigma												
- 1 Sigma												
- 2 Sigma												
- 3 Sigma												
- 20 %												
NET CPM CALCULATION {B} - {A} = {C}												
Remarks:							Reviewed by:					

1.0 PURPOSE

This procedure provides consistent methodology for performing source checks and operating portable gamma scintillation dose rate instruments, specifically, the Ludlum Model 12s uR and the Bicron Model Micro Rem. These instruments are used for the evaluation of exposure rates from radioactive materials and determining environmental radiation levels.

2.0 APPLICABILITY

This procedure specifically addresses those instruments that measure count rate from a scintillation detector and have displays that read in uR/hr (Ludlum 19) or uRem/hr (Bicron Micro Rem). Equivalent instruments that operate in a similar fashion to those identified in this section may be used under with RSO approval.

3.0 REFERENCES

1. ANSI N323-1978, Radiation Protection Instrument Test and Calibration.
2. Instrument Technical Manuals.
3. HCCS Radiation Protection Plan (RPP).

4.0 DEFINITIONS

None.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Reviewing and approving changes to this procedure and ensuring compliance with applicable regulations.
- Ensuring an adequate inventory of Radiation Protection instruments are available to support remediation activities.
- Overseeing the issue, control and accountability of Radiation Protection instrumentation per the requirements of this procedure.
- Ensuring transmittal of all issue, control and accountability records to the appropriate document control authority when applicable.

5.2 Radiation Protection Technician (RPT)

- Maintaining instrument documentation and records as required by this procedure.
- Maintaining adequate instrument and equipment availability.
- Verifying current calibration and response test dates prior to issue or use of instruments.
- Promptly returning instruments to their proper location when work is complete.
- Ensuring that instruments are properly surveyed for contamination and decontaminated as necessary, after use.

6.0 PREREQUISITES

1. Only personnel with documented training shall issue or use RP instrumentation.
2. Instruments and detectors shall be inspected for mechanical damage, and response tested prior to issue.

-
3. Any instrument to be used shall have a current calibration label affixed to the instrument.

7.0 PRECAUTIONS AND LIMITATIONS

Portable count rate survey instrumentations are susceptible to damage from physical and environmental stresses.

8.0 APPARATUS

1. Survey instrument.
2. Tech source.
3. Source positioning device (jig).

9.0 RECORDS

1. HCCS Daily Field Source Check Log – Exposure Rate Instruments (Attachment 1).
2. HCCS Exposure Rate Instrument Set-Up Sheet (Attachment 2).

10.0 PROCEDURE

10.1 General

- Ensure the instrument selected is within their acceptable calibration periods. This is indicated on an attached calibration sticker. Illegible stickers should be replaced prior to instrument use.
- The RPP Group will coordinate instrument calibration on a minimum annual basis and after major repair operations. Battery change-outs do not require re-calibration. Calibration procedures are outside of the scope of this instruction.
- Pre-operational source checks are required daily, or prior to each intermittent use, whichever is less frequent. Post-operational source checks are performed as specified in work plans or procedures. Instruments used in the performance of daily activities do not normally require a post-operational source check.
- Instrument set-up and subsequent operational checks should be performed in the same location, with consistent temperature and radiation background levels.
- Use a gamma check source with an activity sufficient to produce contact exposure rates at least ten times higher than background. Cs-137 is typically used since it emits 662 keV gamma rays which are representative of the mid-range of gamma energies encountered at HCCS. Alternate sources may be used with RSO approval.
- Source positioning devices (i.e., jigs) should be used to ensure a reproducible geometry between instrument checks. Source geometry must be consistent between initial instrument set-up and subsequent operational checks.
- The Ludlum 12s may be operated in the FAST response mode. Switch to SLOW response for obtaining precise readings.
- Internal scintillation crystals are orientated towards the front of the instrument. Meter cases have visible indicators showing optimum locations to obtain measurements (i.e., effective detector center).
- Allow instrument readings to maximize prior to recording instrument reading. This may take up to twenty seconds. Note that the needle may not rest on a single value, but may fluctuate slightly between two points on the scale. If this is the case, an average reading should be obtained by summing these two end points and dividing by two.
- Instruments should be allowed to warm-up for at least one minute prior to obtaining readings.

- Report any abnormal instrument readings (e.g., unstable analog meter fluctuations), or background inconsistencies to the RSO, prior to continuing instrument use.
- Instruments that fail operational checks or malfunction during use should be tagged or labeled “Out-of-Service,” or “Do Not Use,” and segregated from operational instruments. If possible, describe the problem on the tag / label and add initials and date.
- Instruments leaving RPP Group control (i.e., repair, calibration, excess, etc.) shall be surveyed for unconditional release. The repair / calibration center may request a copy of the survey to accompany shipments of RP instruments.

10.2 Instrument Source Check

- Obtain the selected instrument.
- Obtain the corresponding HCCS Daily Field Source Check Log – Exposure Rate Instruments form, Attachment 1. This form will be referred to as the “Source Check Log.” Initiate a new Source Check Log, if necessary.
 - Perform a physical inspection of the instrument. Place particular emphasis on the following items: Instrument case is not visibly damaged beyond minor scrapes and scratches.
 - Analog display is not cracked or otherwise damaged.
 - Switches and buttons are functional.
 - Audio, if present, is functional.
 - Calibration labels are legible and instrument is within calibration period.
- Note results of physical inspection on the Source Check Log.
- Verify the battery level is within the acceptable range on the analog display. Replace batteries and re-verify, as necessary.
- Note battery check results on the Source Check Log.
- Verify the high voltage (HV) level is within the acceptable range on the analog display, if present. Place the instrument out-of-service if the HV is outside the acceptable range.
- Note the HV check results on the Source Check Log.
- If acceptable background ranges have not been established, perform the following:
 - Obtain a blank HCCS Exposure Rate Instrument Set-Up Sheet, Attachment 2. This form will be referred to as the “Set-Up Sheet.” Record the basic source and instrument information at the top of the form.
 - Using the instrument and the source jig (without source), obtain and record ten background readings.
 - The instrument should be removed from the source jig and repositioned after each reading is obtained. Make sure the location where readings are obtained has stable background levels and is the location used for subsequent source checks.
 - Calculate and record the average background value and +/- 20% values on both the set-up and source check logsheets.
- Obtain and record an average background reading on the source check log.
- Compare the average background reading to the acceptable range. If background response is outside this range, report the condition to the RSO for evaluation, otherwise continue with source check process.
- Obtain the source to be used for instrument source checks.
- If acceptable source check ranges have not been established, perform the following:
 - Obtain the Set-Up Sheet used to determine acceptable background ranges for the instrument.

- Using the instrument and the source jig (with source), obtain and record ten contact source readings. The instrument and source should be removed from the source jig and repositioned after each reading is obtained. Make sure the location where readings are obtained is the same location where previous background readings were obtained.
- Calculate and record the average source value and +/- 20% values on both the set-up and source check logsheets.
- Load the source and instrument onto the source jig.
- Obtain and record the “CONTACT” reading.
- Verify the contact reading is within the acceptable range (+/- 20%).
- If the contact source reading falls outside the acceptable range, tag the instrument out of service and notify the RSO, otherwise continue.
- Complete the source check log including technician initials. The instrument is now ready for use.
- Ensure sources and forms are stored properly after use in the designated storage location. Forms are retained in RP Instrument logbooks of field files during instrument use (i.e. calibration) cycle. Records are then reviewed by the RSO, or designee for completeness and forward to Project Records for retention.

10.3 Operations

- Verify that required source checks have been performed prior to initial instrument use.
- Operate instrument in a manner that minimizes the potential for cross-contamination and physical damage.
- Limit readings taken while the instrument is positioned sideways to minimize the effects of “geotropism” on the analog needle.
- Obtain readings by positioning the instrument as close to the detector’s “effective center” as possible. The detector effective center is represented on the instrument housing a cross inside a circle on the Bicon Micro Rem, and a small circular depression on the Ludlum 12s. Overall optimum readings are collected from the front of the instrument housing.
- Most instruments will operate in temperatures between 10 and 120 degrees Fahrenheit. However, anytime the temperature is outside of the 32 degree (freezing) or 100 degree ranges, observe the following precautions:
 - Be observant of instrument response to background. If the instrument begins to show a decreased response to expected background levels contact the RSO, or designee for guidance.
 - If practicable, perform a period response check of the instrument against a known source of radiation. If the instrument appears to be responding incorrectly contact the RSO or designee for guidance.
 - Contact the RSO for guidance anytime work is planned outside of the 10 to 120 degree range.
- Protect instruments, to the extent possible, from exposure to moisture (i.e. rain, snow, etc.) during use. Instruments shall be stored in a safe manner when not in use.
- Perform a post-operational source check after use, if directed by work plan, procedure, or the RSO.

11.0 ATTACHMENTS

Attached forms are examples and may be modified by the RSO, as needed, without revision to this procedure.

Attachment 1 HCCS Daily Field Source Check Log – Exposure Rate Instruments (Typical)

Attachment 2 HCCS Exposure Rate Instrument Set-Up Sheet (Typical)

Attachment 1

HMCS Daily Field Source Check Log – Exposure Rate Instruments (Typical)

FMSS DAILY FIELD SOURCE CHECK LOG - EXPOSURE RATE INSTRUMENTS										
MONTH / YEAR: _____										
INSTRUMENT DATA		Date/Time	Physical	Battery	High Voltage	Audio	Background	Contact Source	PASS or FAIL	Tech. Initials
INSTRUMENT										
MODEL										
SERIAL#										
CAL DUE										
HV										
SOURCE DATA										
ISOTOPE										
SERIAL #										
ACTIVITY										
uCi										
INSTRUMENT RANGES										
	Background	Contact Source								
+ 20 %										
- 20 %										
Units (Circle One										
uR urem mR mrem R rem										
Remarks:						Reviewed by:				

Attachment 2

HCCS Exposure Rate Instrument Set-Up Sheet (Typical)

FMSS EXPOSURE RATE INSTRUMENT SET-UP SHEET

Set-Up Location: _____

INSTRUMENT DATA		READING (n)	Background Rate	Contact Source Rate	CALCULATED AVERAGE AND RANGES		
	INSTRUMENT				Background		Contact Source
MODEL		1					
SERIAL #		2				Average + 20%	
CAL DUE DATE		3				Average	
HV		4					
		5				Average - 20%	
SOURCE DATA		6			Units (Circle One)		
ISOTOPE		7			uR urem mR mrem R rem		
SERIAL #		8			REMARKS		
		9					
ACTIVITY (uCi)		10					
Performed By:		Date/Time:		Reviewed By:		Date/Time:	

1.0 PURPOSE

The purpose of this procedure is to establish consistent methodology for the calibration and operation of low volume (Lo-Vol) sampling pumps such as the F&J Model LV-1, Hi-Q PSU-2, or equivalent; as well as the documentation of workplace surveys using sampling pumps. Other low volume samplers with similar operating characteristics may be utilized under this procedure with approval of the Radiation Safety Officer (RSO).

2.0 APPLICABILITY

This procedure applies to all personnel who may reasonably be expected to utilize the low volume sampling pump for workplace surveillance activities. Digital low-volume sampling pumps that perform self-calibration and flow correction may be used under this procedure when augmented by the use of the applicable instrument operations manual.

3.0 REFERENCES

1. F&J Specialty Products, "Technical Manual, Regulated Low Volume Air Sampler Model: LV-1," Rev. 06/09/95.
2. Ness, S., "Air Monitoring for Toxic Exposures," 1991.
3. U.S. Army Corps of Engineers (USACE), "EM 385-1."
4. HCCS "Site Safety and Health Plan" (SSHP).

4.0 GENERAL

4.1 Discussion

The constant-flow sampling pump is the primary device for actively collecting integrated samples on media. Constant-flow pumps like the F&J models in use at the HCCS can cope with changing conditions such as filter loading and still maintain a constant sampling rate within certain limits by measuring and regulating the actual input flow. These pumps are typically used for general work area and perimeter air sampling for radiological particulates.

4.2 Definitions

Low Volume Air Sampling Pump: A portable air sampling device, generally a rotary vane pump, mechanically designed to maintain fairly constant flow rates over a given sampling period thus permitting occupational exposure calculations. The manufacturer of these pumps describes them as "low volume" although they typically operate at flow rates between 10 and 100 lpm.

Primary Standard: A highly accurate flow calibration device with NIST-traceable specifications. Primary standards, such as the F&J Model D-812 currently used at the HCCS, shall be returned to the manufacturer annually for maintenance and calibration assurance.

Sampling TRAIN: The connected combination of collection media, sampling pump, tubing, and a flow rate measuring device.

Calibration (specific to this instrument): The process of adjusting and recording flow rates of the sampling pump using a primary flow calibrator. Flow calibrations using a primary standard shall be performed annually. Pump calibrations expire one year from date of last calibration.

5.0 RESPONSIBILITIES

5.1 Site Safety and Health Officer (SSHO)

The SSHO is responsible for:

- Providing oversight to all Safety and Health air monitoring performed on the Project.
- Defining and establishing air sampling protocols for specific contaminants at the HCCS.

5.2 Radiation Safety Officer (RSO)

The RSO is responsible for:

- Directing radiological air monitoring strategies based upon established protocols and plans.
- Reviewing air monitoring results and initiating necessary follow-up actions.

5.3 Radiation Protection Technicians (RPTs)

RPTs are responsible for:

- Ensuring proper performance of air monitoring instrumentation through daily inspections and annual on-site calibrations.
- Deploying and operating air sampling pumps in the workplace in a logical and effective manner so as to ensure representative sampling and meaningful exposure data.
- Performing regular “checkups” on deployed air sampling pumps, verifying proper operation and noting any unusual occurrences such as flow interruptions or inappropriate sampling locations.
- Documenting workplace air monitoring activities on appropriate documentation.

5.4 Project Workers

Project workers are responsible for the following:

- Notifying RPTs of any power disconnections to or pump malfunctions of work area or perimeter air samplers.
- Providing assistance to RPTs in the setup of work area or perimeter air samplers, e.g., helping to obtain extension cords, constructing stands or shelters, etc., if needed.

6.0 PREREQUISITES

The pump must have been calibrated with an electronic mass flowmeter, a primary standard prior to field use. Flow calibrations are valid for 365 days after calibration date. Calibration shall be performed with the intended sampling media (47 mm glass fiber filter) included in the sampling train.

7.0 PRECAUTIONS AND LIMITATIONS

- Only authorized personnel are permitted to operate air sampling equipment.
- Because personal air sampling pumps are often relied upon to provide critical personnel exposure data, quality care of these devices is essential. Pumps should be inspected after each sampling event

for missing or damaged parts and repaired promptly. Pumps with damaged power cords shall be tagged and taken out of service.

- Verify that the sampling media is appropriate for the intended sampling event, e.g., 47 mm glass fiber filter for radiological particulate monitoring.
- Samplers may be fitted with totalizers to capture operating run times. These values should be recorded, if available, to better estimate overall sample volumes and to determine if interruptions in operations occurred.

8.0 APPARATUS

- F&J LV-1 low volume air sampler
- Electronic mass flowmeter, such as F&J Model D-812
- Tygon tubing, filter holder, and appropriate sampling media
- Small tool kit for pump adjustments

9.0 RECORDS

Completed “Calibration Certificate and Data Sheet for the Low Volume Air Sampler” will be sent to RPP Records until transmitted to Project Document Control.

10.0 PROCEDURE

10.1 Instrument Setup

1. The user should familiarize himself / herself with the Technical Manual for the LV-1 or PSU-2 before using for the first time.
2. Perform a visual inspection of the instrument unit making sure all components are in sound condition.

10.2 Instrument Calibration

1. Obtain a “Calibration Certificate and Data Sheet for the Low Volume Air Sampler,” an air sampler, and an electronic mass flowmeter.
2. Record general site and pump information in the top section of the form.
3. Connect the dual-head calibration filter holder assembly to the air sampler in place of the regular filter holder. Verify that an intact 47mm glass fiber filter is properly positioned in the holder assembly.
4. Turn on power to the air sampler and to the mass flowmeter.
5. Perform a physical inspection of the pump. Check SAT/UNSAT.
6. Adjust the air sampler rotameter to 50 lpm. Use the widest point (middle) of the float as an adjustment guide.
7. Record the electronic mass flowmeter reading. Ensure this value is within 20% of the rotameter setting. Take instrument out of service if not within this range.
8. Perform 3 reproducibility measurements at 60 lpm. These three readings should be within 10% of their average.
9. Adjust the air sampler rotameter to 30 lpm. Record the electronic mass flowmeter value. Calculate the error and record on form.
10. Repeat the above step for 50, 60, and 70 lpm.
11. If any calibration check point has an error greater than 10%, then affix a chart of actual versus indicated flow data to the air sampler.
12. Affix calibration sticker with date due for next calibration and initials to air sampler.

13. Submit calibration certificate to the Radiation Safety Officer for review.
14. Maintain completed documentation in RPP Records until transmitted to Project Document Control.

10.3 Instrument Use

1. Consult with the RSO before initial deployment of work area or perimeter air samplers to verify locations and flow rates.
2. Ensure low-volume samplers are positioned between 4 and 6 feet above ground level and that they are protected from inclement weather.
3. Before pump activation, place the appropriate sampling media 47 mm glass fiber filter into the filter holder and screw down tightly.
4. Document applicable RWP, pump location, serial number, date, time on, and starting flow rate on pre-stamped manila envelope.
Note: General work area air samplers are typically set to 60 lpm on the rotameter scale. Only actual flow rates (as opposed to rotameter readings) shall be recorded on the envelope.
5. Turn on pump. Adjust the flow to desired rate using the flow adjust knob. Use the middle (widest) point of the rotameter float as a guide.
6. Perform periodic “checkups” on activated low-volume air samplers to confirm their proper operation.
7. Upon completion of the sampling event, note final flow rate and off time. Turn off pump and secure for the next sampling event.
8. Collect the filter from the holder. Place filter into the same manila envelope used to record initial start data. Record the time off, final flow rate, and initial the manila envelope.
9. Filters collected for radiological particulate monitoring (except radon) should be allowed to decay for a period of at least 3 days (72 hrs) prior to counting, unless directed otherwise by the RSO or SSHO.

10.4 Instrument Documentation

- Record the annual flow calibration data onto the “Calibration Certificate and Data Sheet for the Low Volume Air Sampler.”
- Record daily sampling event information onto manila envelopes.

10.5 Instrument Maintenance

Lubrication

- The oil-less pump motor requires no lubrication to maintain optimal efficiency during its service life.

Corrosion

- The outer end plate, body, rotor and mounting bracket are all cast iron and will tend to corrode when exposed to moisture. Therefore, precautions should be taken to shelter or protect sampling pumps from water exposure.

Foreign Particles

- Remove excessive dirt or foreign particles from inside motor housing using long tweezers. If this is not possible, loosen and remove the six bolts which connect the end plate and body housing to expose internal components for inspection.

Fuses

- Fuses may blow from time to time due to line voltage fluctuations. Should a fuse blow and require replacement, first, disconnect power cord. Then open the fuse compartment door at the rear of the pump next to the on / off switch, remove blown fuse, and replace with new fuse (6 ¼ or 7 amp). Re-latch fuse cover.

Carbon Rotor Vanes

- Carbon rotor vanes should have a useful service life between 5,000 and 10,000 hours depending on usage conditions. When vanes become worn, they should be replaced. Loosen and remove the six bolts which connect the end plate and body housing to expose the rotor vanes.

Replacement Parts

- A list of replacement parts can be found on page 15 of the F&J Technical Manual for the LV-1. Refer to the exploded view drawing of the LV-1 pump on page 15 for parts identification.

11.0 ATTACHMENTS

Attached form(s) are examples and may be modified by the RSO with revision to this procedure.

Attachment 1: "Calibration Certificate and Data Sheet for the Low Volume Air Sampler" (Typical)

Attachment 1 (Typical)

CALIBRATION CERTIFICATE AND DATA SHEET FOR THE LOW VOLUME AIR SAMPLER					
SECTION 1: GENERAL INFORMATION					
DATE:		LOCATION:		TECHNICIAN:	
MANUFACTURER:			MODEL:		
SERIAL #:			DATE LAST CAL. EXPIRES:		
REASON FOR CALIBRATION: Due For Calibration <input type="checkbox"/> Repair (see remarks) <input type="checkbox"/> Other (see remarks) <input type="checkbox"/>					
EQUIPMENT USED:					
TYPE:		IDENTIFICATION:		CAL. DUE DATE	
FILTER HEAD AND FILTER TYPE USED:					
SECTION 2: AS-FOUND DATA					
PHYSICAL CONDITION: SAT / UNSAT		LO-VOL SET @ 50 LPM Y / N		ACTUAL:	
IS THE ACTUAL READING WITHIN 20% OF THE INDICATED VOLUME ON THE AIR SAMPLER? Y / N					
REPRODUCIBILITY:	1	2	3	AVG:	
REPRODUCIBILITY: IS REPRODUCIBILITY WITHIN 10% OF THE AVERAGE? Y / N					
SECTION 3: CALIBRATION DATA					IS ERROR WITHIN 10%
TARGET VALUE	ACTUAL AIR FLOW (CAL. READING)	INDICATED AIR FLOW (ROTOMETER)	ERROR	YES	NO
30 LPM					
40 LPM					
50 LPM					
60 LPM					
70 LPM					
IF ERROR IS GREATER THAN 10%, POST THE INSTRUMENT WITH A CHART OR GRAPH OF ACTUAL VERSUS INDICATED					
REMARKS:					
NEXT CALIBRATION DUE:			CALIBRATION STICKER ATTACHED? Y / N		
PERFORMED BY:			REVIEWED BY:		
			DATE:		

1.0 PURPOSE

This procedure provides consistent methodology for the operation of fixed counting systems to include Chi-squared testing, establishing acceptable ranges, daily performance testing, and sample counting operation of fixed counting systems.

2.0 APPLICABILITY

This procedure applies to Ludlum Models 2000/43-10, 2929/43-10-1, and 3030/43-10-1 instrument/detector combinations. The Radiation Safety Officer (RSO) may permit other instrument/detector combinations, similar in function, to be operated under the scope of this procedure.

3.0 REFERENCES

1. Ludlum Measurements; Ludlum Model, 2000, 2929, 3030 Scaler – Instruction Manuals.
2. Ludlum Measurements; Ludlum Model 43-10-1 – Instruction Manual.
3. EFS-RP-04, “Radiological Surveys”

4.0 GENERAL

4.1 Discussion

Performance checks are performed daily, or prior to intermittent use, whichever is less frequent. Post-operational performance checks are performed as required by specific plan, or procedure. A performance check should also be performed anytime instrument response is suspect.

Deviation from any aspect of this procedure requires specific Radiation Safety Officer (RSO) approval.

4.2 Definitions

Minimum Detectable Activity / Minimum Detectable Concentration (MDA / MDC): The lowest activity or concentration of radioactive material in a sample that will yield a net count above system background, that will be detected with 95% confidence while accepting a 5% probability of a false positive (Type I error) or a false negative (Type II error). MDA / MDC depends upon the type of instrument, the counting geometry, and the radionuclide to be detected. MDA has the same meaning as Lower Limit of Detection (LLD).

The following MDA/MDC equation is to be used:

$$\text{MDC} = \frac{3 + 3.29 \sqrt{B \cdot t_s \left(1 + \frac{t_s}{t_{bg}}\right)}}{t_s \cdot E \cdot A \cdot \text{SAF}}$$

Where:

B	= Background count rate, in cpm, of counting instrument
T_s	= Sample count time
T_{bg}	= Background count time
E	= Instrument efficiency
A	= Area correction factor, if applicable
SAF	= <i>Self Absorption Factor</i>

Chi-Squared Test: A Chi-squared test is used to determine the precision of a counting system. It is a measure of the reproducibility of results. The Chi-squared value is calculated as:

$$X^2 = \frac{\sum (\chi_i - \bar{\chi})^2}{\bar{\chi}}$$

Variance: Variance is defined as the amount of scatter of data points around the mean.

Standard Deviation: Standard Deviation is defined as the square root of the average squared variance and the population standard deviation is defined mathematically as:

$$\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

Acceptable Range: Acceptable range for background and source efficiency is defined as plus or minus 2 standard deviations of the mean or average value.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Oversight of the Radiation Protection (RP) Instrument Program.
- Reviewing instrumentation documentation.
- Approves deviations from this procedure.

5.2 Radiation Protection Technician (RPT)

- Performing / overseeing daily performance checks and routine sample counting.
- Reviewing daily performance checks and routine sample counting documentation.

6.0 PREREQUISITES

The instrument shall have been calibrated within the previous 12-month period.

7.0 PRECAUTIONS AND LIMITATIONS

1. Inspections, Chi-square tests, establishing acceptable ranges, and daily performance checks shall only be performed by trained technicians.
2. A physical inspection shall be performed prior to initiating any of the above operations. This inspection should include inspection of readouts, meters, slide-tray and cam-lock, cable(s), cords, and general physical condition of the instrument/detector. The inspection shall include confirmation

of current calibration and that a current calibration sticker is affixed to both the instrument and the detector.

3. Operating parameters shall be verified. These parameters should include operating voltage verified against the calibrated value and battery condition if in use.

CAUTION

The charge (CHG) position on the function switch shall not be used on Ludlum Model 2000 instruments utilizing non-rechargeable batteries. The non-rechargeable batteries could rupture or explode, causing corrosion to the battery holder and damage to the instrument.

4. Any instrument/detector failing the above inspections shall not be used until corrective action has been made. If the calibration is in question, tag the instrument out-of-service until corrective actions have been completed and a new calibration performed.
5. The background (BKG) count shall utilize the same counting geometry as the samples to be analyzed (i.e., a clean blank smear if smears are the media to be analyzed).
6. Chi-squared tests shall use a minimum of 10 points of reference; both background and source counts. An acceptable value obtained from the Chi-squared test must fall between the values 10.12 and 30.14. Values outside these limits indicate the instrument/detector is not functioning correctly. The instrument/detector shall not be used for data collection until corrective action has been taken and an acceptable Chi-squared value has been obtained.
7. An acceptable range for background and source efficiency shall be established prior to operational data collection.
8. Use gloves to handle the electroplated check sources. The use of tweezers may result in scratching the source and subsequent loss of activity.
9. Use planchets for all source / sample counts, unless otherwise directed by the RSO.
10. Select planchets with sidewalls short enough to avoid contact with the detector surface during instrument use and sample change-out.

8.0 APPARATUS

1. Ludlum Model 2000; Scaler in combination with Ludlum Model 43-10; Alpha Sample Counter.
2. Ludlum Model 2929; Scaler in combination with a Ludlum Model 43-10-1 Beta-Gamma / Alpha Sample Counter.
3. Ludlum Model 3030; Scaler in combination with a Ludlum Model 43-10-1 Beta-Gamma / Alpha Sample Counter.
4. Planchets state size and type (i.e. flat 47 mm with 3 mm wall stainless steel planchet, state Model and Manufacturer or equivalent).
5. Check source(s) containing the nuclide(s) of interest or nuclide(s) with similar energy(ies).
6. Blank filter or smear media.

9.0 RECORDS

1. Chi-square / Acceptable Range Data Sheet (Attachment 1).
2. Daily Field Source Check Log – Fixed Counting System (Attachment 2).
3. Computer generated printouts of instrument operability.

10.0 PROCEDURE

The methods outlined in this procedure are intended to assure the clear and concise transfer of survey information. Variations or deviations from the protocols in this procedure are permitted if the clear transfer of information is maintained.

10.1 Chi-Squared Test

- A. Complete the required information on the “Chi-squared / Acceptable Range Data Sheet” (Attachment 1).
- B. Place the appropriate background blank or source in the detector.
- C. Select the appropriate count time.
- D. Collect 10 background and 10 source counts. Alternate source and background counts.
- E. Record the gross readings in the appropriate section on the “Chi-squared / Acceptable Range Data Sheet” (Attachment 1).
- F. Enter the Gross BKG and gross source counts into the appropriate columns of the Chi-square (CHISQR) Excel® spreadsheet utility. The RSO or designee maintains this utility.
- G. Compare the Chi-square results. The results must fall between the values of 10.12 and 30.14.
- H. If a Chi-square value falls outside the range notify the Lead Radiation Protection Technician or RSO. The instrument shall not be used for data collection until corrective action has been taken and an acceptable Chi-square value has been obtained.
- I. Obtain a printout of CHISQR spreadsheet results.

10.2 Acceptable Range

- A. Calculate and / or record the background counts per minute, (BKG cpm), Column B and the Source cpm, Column D on the Chi-square / Acceptable Range Data Sheet. A computer printout with duplicate data may be attached in lieu of this step.
- B. Enter the above values into the appropriate columns of the Acceptable Range (ACTRNG) Excel® spreadsheet.
- C. Obtain a printout of ACTRNG spreadsheet results.
- D. Assemble, review, and sign an instrument acceptance package consisting of:
 - Chi-square / Acceptable Range Data Sheet
 - CHIQR printout(s)
 - ACTRNG printout(s)
- E. Submit the “Set-Up” package to the RSO or designee for review and signature.
- F. If package is approved, initiate a Daily Field Source Check Log – Fixed Counting System form (Attachment 2). Transpose the following information from the “Set-Up” package.
 - Instrument information
 - Source Data
 - Acceptable ranges (+/- 2 and 3 Sigma values)
- G. Place the “Set-Up” package in RP lab files until transmitted to Project Records. This data may need to be available for later review or for generation of control charts.
- H. Place the Daily Field Source Check Log – Fixed Counting System form in the designated instrument file / folder for later use.
- I. The instrument is now available for sample counting.

10.3 Performance Checks

- A. Obtain the Daily Field Source Check Log for the instrument to be checked.
- B. Perform a background (BKG) count of sufficient time to meet required MDA or MDC values. Perform MDC calculation(s) as necessary to verify acceptability of background count times.
 - The BKG count time should be equal to the anticipated sample count time.
 - The BKG count shall utilize the same counting geometry as the samples to be analyzed (i.e., a clean blank smear if smears are the media to be analyzed).
- C. Record the Background Counts and Background Count Time (min) on the Daily Field Source Check Log (Attachment 2).
- D. Calculate and record the BKG counts per minute (cpm) on the Daily Field Source Check Log.
- E. Compare the BKG cpm to the BKG 2 sigma acceptable range.
 - **If** the BKG cpm does not fall within the 2-sigma range, **then** compare the result to the 3-sigma range.
 - **If** the instrument/detector fails to fall within the 3-sigma acceptable range, **then** the instrument/detector shall be tagged out-of-service and shall not be used.
 - **If** the BKG cpm does not fall within the 2-sigma acceptable range but is within the 3-sigma range, **then** perform and record on the Daily Field Source Check Log, another background count and compare that value to the 2-sigma acceptable range.
 - **If** the second count is within the 2-sigma acceptable range, **then** the instrument/detector may be used.
 - **If** the instrument/detector fails to fall within the 2-sigma acceptable range in two consecutive attempts, **then** the instrument/detector shall be tagged out-of-service and shall not be used.
- F. Perform a daily source count using the same source used during initial set-up. This count is not required to be of the same duration as the background or sample analysis count times. However, the source count time shall be at least 1 minute and should be long enough to produce reliable counting statistics and control chart results.
- G. Record the Gross Source Counts and Source Count Time (min) on the Daily Field Source Check Log.
- H. Calculate and record the source cpm.
- I. Calculate and record the daily efficiency on the Daily Field Source Check Log. The formula is printed on the form as reference.
- J. Compare the daily efficiency to the source 2-sigma acceptable range.
 - **If** the daily efficiency does not fall within the 2-sigma range, **then** compare the result to the 3-sigma range.
 - **If** the instrument/detector fails to fall within the 3-sigma acceptable range, **then** the instrument/detector shall be tagged out-of-service and shall not be used.
 - **If** the daily efficiency does not fall within the 2-sigma acceptable range but is within the 3-sigma range, **then** perform and record, on the Daily Field Source Check Log, another source count and compare that value to the 2-sigma acceptable range.
 - **If** the second value is within the 2-sigma acceptable range, **then** the instrument/detector may be used.
 - **If** the instrument/detector fails to fall within the 2-sigma acceptable range in two consecutive attempts, **then** the instrument/detector shall be tagged out-of-service and shall not be used.
- K. Use daily background and source check results to generate control charts, unless otherwise directed by the RSO.
 - Review charts periodically for negative instrument performance trends. Negative trends can be identified by the lack of a reasonable distribution of data points on the chart (e.g., three

- identical values, three consecutively increasing or decreasing values, five consecutive data points on one side of the line, etc.)
- Store control charts with the Daily Field Source Check Log sheet or electronically until completed.
 - Report Control Chart anomalies to the RSO or designee. Discontinue instrument use until anomalies are resolved.
- L. Complete and initial the Daily Field Source Check Log and return to the file / folder. If all checks were successful, the instrument is ready for use.
- M. When the instrument has completed its calibration cycle or is placed out-of-service requiring calibration, perform the following:
- Assemble instrument set-up, source check, and control chart documentation into a package. Review for completeness and legibility.
 - Submit the package to the RSO or designee for review.

10.4 Counting Operations

- A. Record the required instrument information (e.g., model number, serial number, efficiency, MDA, etc.) on the appropriate survey form.
- B. Set the required count time utilizing the two-decade thumb-wheel and the time multiplier switch.
- C. Using tweezers or gloves, Place the sample to be counted in a clean planchet.
- D. Place the planchet in the slide-tray. Close and lock the slide-tray.
- E. Initiate the count by pressing the “COUNT” button.
- F. Upon completion of the count period, record the results on the appropriate survey form.
- G. Open the slide tray and remove the sample.
- H. Continue with the previous steps until all samples are counted and recorded.
- I. Perform a post-operational check, if required by plan or procedure. This is accomplished in the same fashion as the daily operational check. Report any instrument failures immediately to the RSO or designee.
- J. Submit the data for review and data entry.

11.0 ATTACHMENTS

Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachments.

- Attachment 1 Chi-Square / Acceptable Range Data Sheet
Attachment 2 Daily Field Source Check Log – Fixed Counting System

Attachment 1

CHI-SQUARE/ACCEPTABLE RANGE DATA SHEET

DATE: _____ PERFORMED BY: _____

INSTRUMENT: _____ SERIAL #: _____ CAL DUE: _____

PROBE: _____ SERIAL #: _____ CAL DUE: _____

SOURCE: _____ SERIAL #: _____ CAL DUE: _____

BKG COUNT TIME: _____ SOURCE COUNT TIME: _____

CALIBRATED OPERATING VOLTAGE: _____

COUNT #	GROSS BKG (A)	BKG CPM (B)	GROSS SOURCE (C)	SOURCE CPM (D)	EFF (E)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Note: Columns B, D, and E are not required to be completed if data is tabulated via computer utility with printouts attached.

DATA ENTRY VERIFIED BY: _____ DATE: _____

SET-UP REVIEWED BY: _____ DATE: _____

Attachment 2

DAILY FIELD SOURCE CHECK LOG
FIXED COUNTING SYSTEM

MONTH / YEAR: _____

INSTRUMENT DATA			Date/Time	Source Gross Counts	Source CNT TIME (min)	Source (cpm) {A}	Background Gross Counts	BKGD CNT TIME (min)	Background CPM {B}	NET CPM	Calculated Efficiency {D}	Tech. Initials
SCALER	DETECTOR											
MODEL												
SERIAL #												
CAL DUE												
SOURCE DATA												
ISOTOPE												
SERIAL #												
ACTIVITY dpm {C}												
ACCEPTABLE RANGES												
	Background	Efficiency										
+ 3 Sigma												
+ 2 Sigma												
- 2 Sigma												
- 3 Sigma												
Daily Efficiency Calculation:												
[(A - B) / C] = D												
Remarks:							Reviewed by:					

1.0 PURPOSE

This procedure provides guidance and requirements for the control of radioactive materials. The radioactive material control program includes receipt, inventory, storage and handling, the release of materials, radioactive sealed source control, control of materials entering Restricted Areas, and the control of contaminated tools and equipment entering the Restricted Area.

2.0 APPLICABILITY

This procedure applies to all Harshaw Chemical Company Site (HCCS) Project personnel. This procedure does not apply to the monitoring of liquid and gaseous effluents, environmental monitoring, or final termination surveys of the facility.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. USNRC Circular 81-07, "Control of Radioactively Contaminated Materials."
3. USNRC IE Information Notice No. 80-22, "Breakdowns in Contamination Control Programs."
4. USAS N13.2-1969, "USA Standard Guide for Administrative Practices in Radiation Monitoring (A Guide for Management)."
5. USACE Engineering and Construction Bulletin No. 2010-5, *Safety Issues with Portable Density Gauges and Moisture-Density Gauges*.
6. EFS-RP-02, "Radiological Posting Requirements."
7. EFS-RP-04, "Radiological Surveys."
8. EFS-RP-05, "Release of Materials for Unrestricted Use."
9. EFS-RP-17, "Conveyance Surveys."

4.0 GENERAL

4.1 Discussion

Radioactive material controls are established to provide positive control of radioactive material, prevent inadvertent release of radioactive material to uncontrolled areas, ensure personnel are not unknowingly exposed to radiation from lost or misplaced radioactive material, and to minimize the amount of radioactive waste material generated during HCCS activities.

4.2 Definitions

Aggregate Material: Items or materials that by their physical nature do not lend themselves to being effectively surveyed using portable instrumentation and require bulk or composite survey techniques or representative sampling and analysis.

Conditional Release of Material: Items or materials that do not meet unconditional release criteria and that are released under the control of Radiation Protection personnel.

Contamination Area (CA): Any area with loose surface contamination values in excess of the values specified in Table 7-1 "Acceptable Surface Contamination Levels" of the HCCS Radiation Protection Manual that is accessible to personnel, or any additional area specified by the RSO. The Contamination Area posting is defined as more restrictive than Radioactive Material Areas, hence all Contamination Area postings are considered to be Radioactive Material Area postings.

Controlled Area: An area outside of a restricted area, but inside the site boundary, where access is limited by HCCS Project Management.

Minimum Detectable Activity (MDA): The smallest amount or concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a “real” signal. MDA depends upon the type of instrument, the counting geometry, and the radionuclide to be detected. MDA has the same meaning as Lower Limit of Detection (LLD), (ANSI N13.3, 1989).

Radioactive Material: Material activated or contaminated by the operation or remediation of the site and by-product material procured and used to support the operation or remediation.

Radioactive Material Area: Any area or room where quantities of radioactive materials in excess of 10 times the 10 CFR 20 Appendix C quantities are used or stored, or any area designated a RMA by the RSO which does not exceed the site Contamination Area criteria.

Restricted Area: Means an area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

Unconditional Release of Material: Release of equipment or material to the general public. The equipment and/or material is deemed to meet site release criteria for both total and removable contamination.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

The RSO is responsible for:

- Ensuring adequate staffing, facilities, and equipment are available to perform the radioactive material control functions assigned to Radiation Protection personnel.
- Investigating and initiating corrective actions for the improper handling of radioactive material.
- Approving purchase or acquisition of radioactive sources.
- Ensuring a source inventory and leak testing program is established.
- Authorizing the establishment of radioactive material and sealed source storage locations.
- Packaging and transferring radioactive material to appropriate authorities.
- Administering receipt/release survey programs of radioactive material.
- Administering radioactive source inventory and leak testing.
- Ensuring correct posting of radiological area.
- Reviewing results of sample analysis and survey data as required to determine acceptability for release of items.

5.2 Radiation Protection Technicians (RPTs)

The RPT is responsible for:

- Performing and documenting radiation and contamination surveys, inspections, and leak tests.
- Posting, securing, and controlling radioactive material and source storage areas.
- Safely opening packages of radioactive material.
- Identifying radioactive material.

- Releasing material in accordance with this and implementing procedures.
- Notifying the RSO or designee on arrival of radioactive material.

5.3 Project Personnel

Project personnel are responsible for:

- Adhering to all policies, procedures, and other instructions, verbal and written, regarding control and minimization of radioactive material and contaminated material.
- Reporting any concerns about the control and minimization of radioactive material and contaminated material to supervision.
- Maintaining good housekeeping at work sites and assisting in preventing the build-up and spread of contamination.
- Obtaining RSO authorization prior to accepting receipt of radioactive material at the project. This includes, but is not limited to, items such as sealed sources, liquid standards, contaminated equipment from other sites, and waste generated outside normal project remediation activities. This is to ensure that required receipt surveys are scheduled, appropriate ALARA considerations are implemented, and that the source term is evaluated for possible effects to the project waste stream criteria.
- Complying with direction from RP personnel regarding the proper methods for receipt, handling, decontamination, packaging, storage, and disposal of radioactive material.

6.0 PREREQUISITES

None.

7.0 PRECAUTIONS AND LIMITATIONS

Packages of radioactive material or sources shall NOT be opened until the required receipt survey is performed by RP personnel.

8.0 APPARATUS

None.

9.0 RECORDS

1. Receipt Radiological Surveys.
2. Source Inventory which includes Leak Test Results.

Records generated shall be transmitted to Project Document Control for filing according to established project Records Retention Schedules.

10.0 PROCEDURE

10.1 Receipt of Radioactive Material

1. Obtain RSO authorization prior to accepting receipt of radioactive material at the project.
 - Radioactive materials which may be received include, but are not limited to, items such as sealed sources (including radiography and soil density gauges) liquid standards, contaminated equipment from other sites, waste generated outside normal project remediation activities, and shipments of radioactive materials from vicinity properties to

- the HCCS for storage and/or transportation and disposal. This is to ensure that required receipt surveys are scheduled, appropriate ALARA considerations are implemented, and that the source term is evaluated for possible effects to the project waste stream criteria.
- Refer to 10 CFR 71.4 and Appendix A to 10 CFR 71 for definition and limits for “Type A Quantities” of radioactive materials.
 - The RSO may direct receipt surveys to be performed on any incoming radioactive material shipment.
2. If an expected package exceeds Type A quantities, the package requestor shall make arrangements with RP and the carrier to receive or pick-up the shipment when the carrier makes notification of package availability.
 3. RP personnel perform receipt inspections and surveys of incoming radioactive material shipments which exceed a Type A quantity (refer to 10 CFR 71.4 and Appendix A of 10 CFR 71) as follows:
 - The inspection and survey shall be performed within three hours of receipt. If received after normal work hours, the survey is required with 3 hours from the beginning of the next business day.
 - Don latex gloves, at a minimum, when performing incoming inspections and surveys.
 - Inspect the package for leaks or apparent damage.
 - Ensure the contents match the packing slip or shipping papers.
 - Perform a radiation survey of the package exterior.
 - Perform a removable contamination survey of the package interior and exterior.
 - RP Personnel shall store the package in a secure, radiologically posted area, notify the RSO or designee, and initiate a Radiological Occurrence Report if any the following conditions are observed during receipt of a radioactive material shipment:
 - Contents do not match packing slip or shipping papers.
 - Contents of the package do not contain the isotopes or quantities of material as ordered or expected.
 - Package is leaking or sufficiently damaged to compromise package contents.
 - The receipt survey results exceed any of the following limits:
 - Radiation (mrem/hr) – 200 @ Contact or 10 @ 1 meter from the package.
 - Removable Contamination (dpm/100cm²) – 2200 Beta-Gamma, 220 Alpha.

10.2 Identification of Radioactive Material

1. Radioactive material exceeding limits specified in 10 CFR 20, Appendix C shall be identified and labeled by Radiation Protection personnel:
 - On receipt of packages containing radioactive material or sources.
 - During removal of items or material from contaminated systems or areas, or from radioactive materials areas.
 - In the course of performing area and job specific surveys.
 - In the course of surveying items for release.
2. Items that meet or exceed the contamination limits established in the EFS Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP) should be labeled radioactive material.
3. Use the following guidance, as a minimum, when labeling radioactive material:
 - Labels shall only be placed or removed by Radiation Protection personnel.

- Unique features (e.g., yellow plastic bags, yellow and magenta tags, purple paint, etc.) should be used to clearly identify the physical and radiological parameters of the material.
 - Labeling shall state “CAUTION – RADIOACTIVE MATERIAL.”
4. Exceptions to labeling requirements for radioactive material are as follows:
- The item or material is under the direct control of personnel who are aware of the contents and the associated radiological hazards.
 - The material is radiation protection equipment (e.g., respirators, instruments, etc.).
 - The material consists of radiological samples being analyzed or sampling equipment controlled by Radiation Protection personnel.
 - The material is packaged and labeled in accordance with DOT regulations while awaiting transport.
 - The material is contained in permanently installed equipment and/or potentially contaminated systems.
 - The material consists of permanently installed equipment or components, including check sources installed in radiation monitoring equipment, which have manufacturer supplied check source labels affixed. Radiation level posting requirements shall remain applicable.
 - The material consists of laundered protective clothing:
 - In controlled use, inside the Restricted Area; or
 - Stored in designated laundry containers.
 - The material consists of check sources or sealed sources and source storage containers identified as radioactive material with identifiable labels affixed to the source.
 - The material is stored or in-use in a posted Contamination Area or Airborne Radioactivity Area. All items in these areas are considered potentially radioactive/contaminated until properly dispositioned by RP personnel.
 - The material consists of contaminated items (e.g., hand tools) impractical to label, that are marked with magenta paint.
5. Project personnel should notify Radiation Protection of any items or containers with lost or damaged radioactive material labels.
6. Material requiring labeling as radioactive material which is found uncontrolled and outside a Restricted Area shall be brought to the immediate attention of RP Personnel.

10.3 Storage of Radioactive Material

1. Radioactive Material Storage Areas shall be posted in accordance with EFS-RP-02, “Radiological Posting Requirements.”
2. Radiation Protection personnel should consider the following when specifying radiological requirements for Radioactive Material Storage Areas:
 - Changes to radiation levels in an area as a result of material storage.
 - External environmental conditions are such that significant container degradation does not occur during storage.
 - Material is adequately packaged and controlled to minimize the potential for loss of radioactive material control.
3. Positive control and accountability for sealed sources found in radiography and soil density gauges are the responsibility of the vendor providing that service. These devices are required to be maintained under positive control by the vendor representative at all times while at the HCCS. The following actions shall be implemented if these devices are found to be unattended:

- Notify the RSO immediately.
- Establish positive control of the device including verification of radiation exposure rates.
- Establish radiological controls sufficient to ensure the HCCS project personnel maintain a safe distance from the device.

10.4 Special Considerations for Control of Accountable Radioactive Sources

1. The RSO, or designee, shall serve as the Source Custodian and shall be responsible for the following:
 - Ensuring that all accountable radioactive sources are stored in their designated storage location when not in use.
 - Maintaining a source inventory that includes accountable source identification, isotopic content, activity, assay date, designated storage location, and date and results of most recent semi-annual leak test.
2. Any individual planning to procure a radioactive source for the project shall request approval from the RSO in writing. This request shall include a justification for bringing additional sources onto the project and shall include all necessary source information to update the source inventory.
3. Licensed sources under the control of a licensee (e.g., radiography sources, soil density gauges, etc.) are not maintained in the project accountable source inventory. Project personnel requesting such vendor services shall ensure that the RSO receives evidence of the following prior to mobilization of the source to the project:
 - Written Notification of the intent to bring the source or gauge.
 - Valid NRC or Agreement State radioactive material license including isotope and source activity.
 - Appropriate training and qualifications commensurate with license requirements.
 - Semi-annual leak testing performed by the licensee.
 - Operating and Emergency Response Procedures.
4. The Source Custodian, or designee, shall ensure that a leak test is performed and documented for any accountable source in inventory under any the following conditions:
 - Upon source receipt in inventory.
 - Semi-annually.
 - Prior to transfer to a new permanent storage location.
 - Prior to disposal.
 - If source integrity is compromised.
5. A source leak test consists of a physical source inventory, a visual inspection for source integrity, and a contamination survey capable of detecting the presence of 0.005 microcuries (200 Bq) of removable radioactivity.
6. If direct contact with the source is impractical (i.e., inaccessible, unsafe from an ALARA standpoint, or could potentially compromise source integrity), the source container or storage location may be surveyed as representative of the leak test.
7. All accountable sealed radioactive sources or their individual storage containers shall bear a durable label or tag which includes the following minimum information:
 - Source Identification.
 - Radionuclide(s).
 - Source Activity.
 - Assay Date.

- Source Custodian Name and Contact Number.
8. The RSO shall establish designated locations for the storage of accountable radioactive sources using the following guidance:
 - Sources should be stored in a lockable location.
 - Sources should be stored to minimize exposure to fire or combustible materials.
 - Sources should be stored in such a manner to minimize radiation exposure to personnel routinely present in the area.

10.5 Movement of Radioactive Material

1. Radioactive material or contaminated material shall be properly contained before moving to minimize radiation levels and prevent spread of contamination.
2. Obtain direction from the Project Transportation Specialist and/or the RSO prior to transporting radioactive materials across public highways or railroads regulated by the Department of Transportation.

10.6 Control of Tools, Equipment, and Material

1. All items to be released from radiological controls shall be surveyed by RP personnel.
2. The RSO may authorize the establishment of “Hot Tool” storage areas for reusable contaminated tools, components, equipment, and material. If labeling of these items (e.g., hand tools) is impractical, magenta paint may be used to identify the item as radioactive material.
3. Project Management should ensure that adequate supplies of clean and “hot” tools are available to project personnel. This maximizes worker effectiveness in radiological areas, minimizes survey and decontamination efforts, and reduces radioactive waste generated.
4. Radioactive waste receptacles will be established and maintained for the disposal of items.

10.7 Release of Items from Radioactive Material Controls

1. RP personnel shall perform surveys to release items from radioactive material controls, with the following exception:
 - Hand-carried items (e.g., pens, paper, flashlights, logbooks, clipboards, safety glasses, dosimetry, badges, etc.) under a single individual’s control and that are not expected to have come into contact with potentially contaminated surfaces may be monitored by that individual during the personnel frisking process.
2. RP personnel will survey items designated for unrestricted release according to EFS-RP-05, “Release of Materials for Unrestricted Use.”
3. RP personnel shall ensure the labeling is appropriate and direct Project personnel as how to best disposition the item (i.e., decontamination, packaging, storage, or disposal as radioactive waste) if an item is contaminated and cannot be released for unrestricted use.
4. RP personnel shall ensure that any labeling or marking identifying the item as radioactive material is removed or thoroughly defaced if the release survey indicates that the item may be released for unrestricted use.

11.0 ATTACHMENTS

None.

1.0 PURPOSE

This procedure provides consistent methodology for the issuance of radiation monitoring dosimetry devices at the Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

This procedure applies to all Safety and Health personnel issuing dosimetry devices.

3.0 REFERENCES

1. 10 CFR 20, "Standards for Protection Against Radiation."
2. EM 385-1-80 "Radiation Protection Manual," United States Army Corps of Engineers (USACE).
3. HCCS "Radiation Protection Plan (RPP)."

4.0 GENERAL

4.1 Discussion

This procedure describes the requirements for the issuance of standard dosimetry devices to visitors and radiation workers accessing restricted areas of the HCCS remediation project. The Thermoluminescent Dosimeter (TLD) normally provides the dose of record, while the Self-Reading Dosimeter (SRD) provides a means of deep dose tracking prior to TLD processing, as well as verifying the reasonableness of the results

4.2 Definitions

Radiation Worker: An individual who accesses any Restricted Area unescorted. Radiation Workers shall have successfully completed all requisite medical and training requirements for performing work in Restricted Areas in accordance with EFS Site Safety and Health Plan (SSHP) and EFS-RP-16 "Radiation Worker Training (RWT)".

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

Self-Reading Dosimeter (SRD): A radiation monitoring device (either electrostatic or electronic) that can be read by the wearer at any time and indicates total accumulated dose.

Thermoluminescent Dosimeter (TLD): An integrating detector where radiation energy is absorbed (trapped) and can be read out later by thermal excitation of the detector (ANSI N13.15-1985).

Visitor: An individual who accesses the project site for purposes other than working (e.g., tour the site or meet with an individual).

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

The RSO is responsible for implementing this procedure.

5.2 Radiation Protection Technicians (RPTs)

RPTs are responsible for the performance of this procedure.

5.3 Project Personnel

- Provide the RP with required personal information to track and report radiation exposures (e.g., Social Security/ID Number, Address, Date of Birth, Exposure History from Other Sites, etc.)
- Complying with the Radiation Protection Program (RPP) requirements, including dosimetry care & use requirements identified in Attachment 1.

6.0 PREREQUISITES

Individuals who are planning to visit other radiologically monitored facilities while being monitored at the HCCS shall notify RSO prior to going to the other monitored facility(s).

7.0 PRECAUTIONS AND LIMITATIONS

1. The NRC Form-4 for individuals with current year recorded or estimated exposures from other site(s) shall be reviewed by the RSO prior to issuance of dosimetry. The purpose of this review is to ensure that individuals would not exceed the quarterly exposure limit of 1.25 rem, or the annual exposure limit of 5 rem Total Effective Dose Equivalent.
2. Any individual entering a Restricted Area, or performing work under a Hazardous Work Permit shall wear dosimetry.
3. TLDs will be changed out on a quarterly basis.
4. Employee personal information shall be accessible only to personnel authorized by the RSO, SSHO, or Project Manager.

8.0 APPARATUS

1. Self-Reading Dosimeters
2. Thermoluminescent Dosimeters

9.0 RECORDS

1. Occupational External Radiation Exposure History (NRC Form-4)
2. TLD Issue Form (e.g., TLD Processor Chain-of-Custody)
3. TLD Use & Care Acknowledgement

10.0 PROCEDURE

10.1 Dosimetry Issuance for Visitors

Dosimetry is issued to escorted visitors accessing Restricted Areas, and as required by the RSO.

10.2 Dosimetry Issuance for Radiation Workers

- Ensure that Radiation Worker Training has been successfully completed by the worker prior to dosimetry issue.
- Ensure the individual has completed an NRC Form 4 "Occupational Radiation Exposure History."
- Ensure the individual has completed the "TLD Use & Care Acknowledgement" form.
- Ensure the worker understands the administrative dose limit and the fraction remaining (available dose) for the current year.
- Review all other paperwork for completeness and legibility.
- Issue a TLD to the individual by recording the pertinent information on the TLD Issue Form.

11.0 ATTACHMENTS

Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachment(s).

Attachment 1 Dosimetry Care & Use Acknowledgement Form

Attachment 1**DOSIMETRY CARE & USE ACKNOWLEDGEMENT**

1. Use **only** dosimetry specifically issued to you.
2. Verify that you are wearing the appropriate dosimetry **prior** to entering Restricted Areas.
3. Unless otherwise directed by the RSO, Dosimetry **shall** be worn facing out, and attached to clothing/lanyard on the front of the upper torso. **Do not** attach dosimetry to waist belt loops, safety glasses, or hard hats.
4. Dosimetry **shall** be stored in the designated location during non-work periods.
5. Dosimetry **shall** not be worn off-site or to another radiological facility unless specifically authorized by RSO.
6. If dosimetry is misplaced or damaged, **perform** the following:
 - a. Place work in a safe condition and exit the radiological area;
 - b. Report the lost dosimeter to RP Personnel;
 - c. RP shall initiate a Radiological Occurrence Report (ROR); and
 - d. Obtain RSO authorization to issue replacement dosimetry.
7. **Do not** tamper with or expose dosimetry to excessive heat, security x-rays, or medical radiation sources. Report instances of tampering or unnecessary exposure to the RSO immediately.

Dosimetry is used to monitor your exposure as required by Federal Law and Company Policy. Failure to comply with these or other Radiation Protection Program requirements implemented for your safety, and for the protection of the public and environment may result in revocation of RadWorker Training credentials and Restricted Area access privileges.

I have read and understood the information presented and will comply with Radiation Protection Program requirements as established in the FMSS Site Safety & Health Plan.

Signature

Date

1.0 PURPOSE

This procedure describes the preferred method by which a pregnant worker can request participation in the EFS Harshaw Chemical Company (HCCS) Embryo-Fetus Protection Program (EFPP).

2.0 APPLICABILITY

This procedure applies to EFS radiological workers who request participation in the EFPP, contractors and sub-contractors who support EFS radiological work activities, and the Radiation Protection (RP) Group, who implements the EFPP.

3.0 REFERENCES

1. NRC Regulatory Guide 8.13, Instructions Concerning Prenatal Radiation Exposure.
2. 10 CFR 20, Standards for Protection Against Radiation.
3. EM-385-1-80, USACE Radiation Protection Manual.

4.0 DEFINITIONS

Controlled Area: A Controlled Area is an area outside of a Restricted Area but inside the site boundary, for which access is limited. Controlled Area postings are established to identify those areas owned by or under the control of the Project. The Controlled Area is used for staging materials, parking vehicles, office facilities, sanitation facilities, and deliveries.

Radiation Worker: An individual who accesses any Restricted Area unescorted. Radiation Workers shall have successfully completed all requisite medical and training requirements for performing work in Restricted Areas as specified in Section 8.1 of the HCCS Radiation Protection Plan.

Restricted Area: Restricted Areas are established within Controlled Areas to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials. All posted radiological areas are Restricted Areas.

Declared Pregnant Woman (DPW): A female radiological worker who has voluntarily submitted a written pregnancy declaration to the RSO requesting participation in the Embryo-Fetus Protection Program (EFPP).

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Overseeing implementation of this procedure.
- Evaluates potential radiation exposure to a Declared Pregnant Woman (DPW) based on employee work activities, work area radiation levels, and work area airborne radionuclide concentrations.

5.2 Radiation Protection Technicians (RPT)

Performs radiological surveys in support of the EFPP.

5.3 Project Supervisors

- Maintains awareness of the EFPP and the process by which a female employee can submit/revoke a pregnancy declaration.

- Implementing modification(s) to DPW work assignment or work location based on exposure risk evaluation performed by the RSO.
- Ensuring that pregnant workers who choose to not participate in the EFPP are not discriminated against in any way with regards to exposure to radiation or radioactive materials.

5.4 Declared Pregnant Woman (DPW)

Complying with radiological work and access restrictions implemented by the RSO for the duration of the pregnancy, or until a revocation of DPW status is submitted in writing to the RSO.

6.0 PREREQUISITES

None.

7.0 PRECAUTIONS AND LIMITATIONS

1. The EFPP is limited to those female radiological workers who choose to participate. Other female project employees (non-radiological workers) are limited to an annual exposure of 100 mrem/yr, and are therefore not subject to additional dose restrictions implemented as a DPW.
2. No special action(s) will be taken to limit radiation exposure to a pregnant radiological worker until she submits a written declaration of pregnancy to the RSO.

8.0 APPARATUS

None.

9.0 RECORDS

1. Written Pregnancy Declaration.
2. RSO Evaluation of Radiological Exposure Risks (includes surveys).

10.0 PROCEDURE

1. A pregnant female radiological worker who chooses to participate in the EFPP shall submit a written pregnancy declaration to the RSO. An example declaration is included in Attachment 1.
2. Upon receipt of the written pregnancy declaration, the RSO will inform the DPW's supervisor and initiate an evaluation of employee radiological exposure risks. This evaluation typically includes a review or collection of the following information:
 - Work area air sample results.
 - Work area radiation survey results.
 - DPW job description and responsibilities.
 - DPW year-to-date exposure.
3. Using collected information, the RSO shall document an exposure risk evaluation that includes necessary job assignment and/or work area modifications. The evaluation shall be based on the following parameters:

4. Total Effective Dose Equivalence (TEDE) to the fetus during the entire gestation period shall be limited to 0.5 rem. This includes exposure received between the estimated date of conception and acceptance into the EFPP. If a dose exceeding 0.5 rem has already been received prior to the written declaration of pregnancy, access to Restricted Areas will be prohibited.
5. The TEDE in any one-month of the gestation period shall not exceed 0.1 rem. This is to avoid substantial variation above a uniform monthly exposure rate to a DPW (e.g., receiving all available dose during the first trimester).
6. The RSO shall notify the SSHO of the employee's DPW status and the results of the exposure risk evaluation. The SSHO may provide further direction to the RSO, as necessary.
7. The RSO shall discuss the results of the evaluation with the DPW and her direct supervisor.
8. The DPW and Supervisor shall ensure necessary job assignment and/or work area modifications are implemented and maintained for duration of participation in the EFPP.
9. The RSO shall attach the Pregnancy Declaration to the Exposure Risk Evaluation and submit them to the RP Records Coordinator.
10. DPW participation in the EFPP shall remain in effect until conclusion of the pregnancy, or until the employee submits a written revocation. This can be done at any time and should be of similar format to the Pregnancy Declaration (Attachment 1).

11.0 ATTACHMENTS

Attachment 1: Declaration of Pregnancy (Example)



Attachment 1 (Example)

DECLARATION OF PREGNANCY

TO: Radiation Safety Officer

In accordance with the NRC's regulations at 10 CFR 20.1208, "Dose to an Embryo/Fetus," I am declaring that I am pregnant. I believe I became pregnant in _____ (Month/Year).

I understand that the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 0.5 rem (5 millisieverts) (unless that dose has already been exceeded between the time of conception and submitting this letter). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy.

(Employee Signature)

(Employee Full Name)

(Date)

1.0 PURPOSE

This project procedure defines the requirements for controlling Radiation Protection Program records. It also establishes the requirements for review and temporary storage of these records at Harshaw Chemical Company Site (HCCS) prior to transmittal to Document Control.

2.0 APPLICABILITY

The requirements of this procedure are applicable to records generated by the Radiation Protection Group, and apply to all documents considered to be records.

3.0 REFERENCES

1. 10 CFR 20 "Standards for Protection Against Radiation."
2. HCCS "Radiation Protection Plan" (RPP).

4.0 DEFINITIONS

Non-record: Non-record material includes those classes of documentary or other material that shall be disposed of without archival authority. Examples are copies of records transmitted to Document Control, paper copies of e-mail, and informal notes.

Records: For the purpose of this procedure, records shall be interpreted as radiation protection records. A record is considered to have been "generated" when it has been completed, signed (or initialed) by the generator, and completed required reviews. Examples of records are all survey forms and original Radiation Work Permits (RWP).

Retention Period: The period of time that a record may be retained by the Radiation Protection Group, prior to transmittal to Document Control.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Implementing this procedure and performing oversight activities to ensure compliance with the requirements of this document.
- Establishing an RP Record Retention Schedule.
- Ensuring adequate storage space and personnel are available to perform Records Management activities.

5.2 Radiation Protection Records Coordinator (RC)

- Acts as the departmental contact for records.
- Ensure that records are adequately controlled according to this procedure.
- Ensures that records are transmitted to Document Control in a timely fashion, as defined by this procedure.

5.3 Radiation Protection Technicians (RPT)

- Complying with the requirement for this procedure.
- Protecting records in their possession from loss or damage.

6.0 PROCEDURE

6.1 Radiation Protection Group Functions

The Radiation Protection Group shall:

- Control records in accordance with applicable requirements of this procedure beginning when a record is first generated.
- Prepared records in accordance with Project Procedures.
- Document content, including signatures, that are:
 - Legible and reproducible.
 - Appropriate for the activity performed.
 - Complete per the applicable requirements.
 - Traceable to the activity or item to which it applies.
- If records are damaged (i.e., torn, lost, illegible, or incomplete), action shall be taken and documented to ensure that re-created records are as complete and accurate as possible. Re-created records shall be identified as copies and be signed and dated by the generator.

6.2 Records Coordinator (RC)

The Radiation Protection RC shall:

- Ensure that all records received for transmittal are included on the Record Retention Schedule. The RSO should be notified if any record is not on the schedule.
- Review the records for acceptability by ensuring the content of the record complies with this procedure. The RC shall review each record ensuring that the record is legible, complete, signed and dated, and that the record contains sufficient information to fulfill the intended purpose of the record.

NOTE: The RC is not responsible for the technical adequacy or correctness of the record.

- Coordinate appropriate corrective action with the RSO when the condition of the records is not acceptable.
- Transmit records according to Document Control
- Prepare a document transmittal form, attach the completed form to the documentation package, and forward the records to Document Control.
- Retain a copy of the returned document transmittal form, which documents transmittal to Document Control.
- Maintain a Records Retention Schedule, approved by the RSO and provide a copy to Document Control.

6.3 Control of Records

- Records shall be controlled and properly maintained from the time the record is generated until it is transmitted to Document Control.
- Records shall be stored in a controlled environment that protects the records from damage (i.e., winds, floods, fires, high and low temperatures and humidity and infestation of insects, mold, or rodents).
- Each record shall be reviewed by the RSO to ensure that:
 - The record contains sufficient information to fulfill the intended purpose of the document.
 - The content of the record is accurate and complete.
- Records monitoring transmittal to Document Control shall be stored in a 1-hour fire-rated container, if possible.
- Storage facilities or cabinets with confidential information should be locked when unattended. Storage facilities for other documents should be locked when unattended as is practicable.
- Records that are in the process of being generated may be controlled by electronic storage, provided there is data back-up available.
- Following transmittal, Document Control shall review the documentation to ensure that it is complete as indicated on the transmittal form, sign and date the transmittal form signifying receipt of the record package and return a copy of the signed and dated form to Radiation Protection RC.

7.0 ATTACHMENTS

None

1.0 PURPOSE

The purpose of this procedure is to provide consistent methodology for implementing Radiation Worker Training (RWT) at the Harshaw Chemical Company Site (HCCS).

2.0 APPLICABILITY

RWT is applicable to all EFS employees and subcontractors who perform work within Restricted Areas

3.0 REFERENCES

1. 10 CFR 19, "Notices, Instructions and Reports to Workers: Inspections and Investigations."
2. 10 CFR 20, "Standards for Protection against Radiation."

4.0 GENERAL

4.1 Discussion

Successful completion of the RWT will qualify employees for unescorted access into Restricted Areas, provided other access requirements are met as specified in procedure EFS-RP-01, "Access Control".

Qualified individuals with a demonstrated knowledge of radiological concepts should provide RWT instruction. The RSO approves RWT Instructors.

4.2 Definitions

Controlled Area: An area under the control of EFS management area to which access is limited by Project Management.

Practical Factors: The "performance-based" portion of RWT that focuses on demonstration and evaluation of safe radiation worker practices. Emphasis is given to the donning and doffing of protective clothing and self-monitoring for radioactive contamination.

Radiation Worker: An individual who accesses any Restricted Area unescorted. Radiation Workers shall have successfully completed all requisite medical and training requirements for performing work in Restricted Areas as specified this procedure.

Restricted Area: An area to which access is limited to protect individuals against undue risks from exposure to radiation, radioactive materials, and chemical contaminants. All posted radiological or chemical areas are Restricted Areas.

5.0 RESPONSIBILITIES

The RSO is responsible for implementation of this procedure and approval of course content and materials.

6.0 PREREQUISITES

Prior to obtaining RWT qualification, individuals shall have submitted evidence of completion of other medical / training requirements established in the EFS Site Safety & Health Plan.

7.0 PRECAUTIONS AND LIMITATIONS

1. RWT shall be required on a biannual basis. Active site personnel may be granted up to a 90-day extension beyond the RWT anniversary date, with RSO approval.
2. Individuals must have documented evidence of completing both academic and Practical Factors objectives before being allowed to work unsupervised in a Restricted Area.
3. Personnel may be allowed to challenge the academic examination portion of this training by passing the examination.
4. Bi-Annual re-qualification of the Practical Factors portion of RWT may be by observation of actual work practices.
5. A minimum passing score on the RWT exam and Practical Factors is 80%.
6. Trained emergency response personnel (Fire Department, Ambulance/EMT, Law Enforcement) responding to on-site emergencies are exempt from this training.
7. The RSO may waive the classroom portion of RWT provided the individual is able to show documented proof of successful completion of an equivalent level of training from another facility during the previous 12-month period.
8. RP technicians are exempt from this training.

8.0 APPARATUS

None

9.0 RECORDS

The Site Safety & Health Group shall maintain a copy of the RWT certificate or attendance roster in each employee file.

10.0 PROCEDURE

10.1 RWT Classroom Training

- At a minimum, the following topics shall be discussed during RWT:
 - Fundamental of Radioactivity.
 - Prenatal Exposure Risks.
 - EFS Radiation Protection Plan.
 - Site Specific Radiological Hazards / contaminants.
 - ALARA Concepts.
 - Radiological Postings / Barriers.
 - Emergency Response / Evacuation Routes
- Provide the trainees with a copy of the course materials and all pertinent training forms.
- Present the course material including overhead slides.
- Lecture on the associated concepts.
- Answer any questions the trainees may have.
- Review the material with the trainees prior to administering the exam.
- Administer the RWT exam.
- The proctor will grade the test and review incorrect answers with the trainee.
- Submit the completed exam to RP Document Control.

10.2 RWT Practical Factors Training

- At a minimum, the following topics shall be discussed as part of Practical Factors training:
 - Proper PPE donning and doffing procedures.
 - Use of RWP.
 - Recognition of postings.
 - Utilization of ALARA concepts (time, distance, shielding).
 - Use of frisking equipment and proper frisking techniques.
- Develop a mock-up area from which trainees may be evaluated. Include the following:
 - RWP.
 - Radiological postings.
 - Ropes / barriers.
 - Radiological hazards.
 - Whole body frisking instrument.
 - In-use work areas may be used, with RSO approval, and provided that airborne generating activities are not underway.
- Introduce the practical training by relating it back to the academics the trainees have just completed.
- Explain what will be expected of each trainee.
- Demonstrate how to perform the tasks, talk about good practices while doing so.
- Allow the participants to practice as you coach.
- Proceed to the Mock-Up area and begin Practical Factors evaluation.
- Complete a Practical Factors Evaluation Form.
- Review evaluation results with the trainee and forward form to RP Document Control.

11.0 ATTACHMENTS

None

1.0 PURPOSE

This procedure describes the proper methods for monitoring of personnel (commonly referred to as “frisking”) for external radioactive contamination. This procedure also describes the appropriate actions in the event contamination is detected during the frisking process.

The uncontrolled spread of contamination can be prevented if personnel are properly monitored, contamination found, and the personnel decontaminated. Early detection and removal of contamination from personnel will reduce internal dose from the ingestion and inhalation pathways, and will reduce external dose.

2.0 APPLICABILITY

This procedure applies to all project personnel, subcontractors, and visitors who access areas where a potential for spread of radiological contamination exists. Frisking of personnel is required when personnel are exiting any area controlled for purposes of radioactivity (e.g. Restricted Areas, Contamination Areas, Exclusion Zones, etc.).

This procedure does not apply during emergency response or evacuation activities. Procedural compliance is suspended for personnel that are involved in the emergency and who must exit a Restricted Area promptly until the emergency condition is terminated. Evacuation from or response to acute health/life threatening conditions takes precedence over radiological hazard considerations. Under emergency response/evacuation scenarios, the Site Safety and Health Officer (SSHO) or Radiation Safety Officer (RSO) will direct personnel and provide guidance to Emergency Responders in a manner that best minimizes the spread of contamination without interfering with life-saving action(s).

3.0 REFERENCES

1. 10 CFR 20, “Standards for Protection Against Radiation.”
2. 29 CFR 1910.1200, “Hazard Communication”
3. HCCS Radiation Protection Plan (RPP).
4. EFS-RP-01, “Access Control.”

4.0 DEFINITIONS

CPM: Counts per minute

DPM: Disintegrations per minute

Equipment and Material: Equipment and material refers to any item used in a Restricted Area to support work activities (i.e., hand tools, heavy equipment, plastic, etc.).

Frisk: A commonly used nuclear industry term referring to monitoring performed by individuals using portable contamination survey instruments. Frisking is commonly performed at egress points from posted radiological areas, but can be required at any point by RP.

Personnel Contamination Event (PCE): A radiological occurrence that results in the detectable presence of radioactivity (excluding radon) on skin or clothing in excess of normal background. PCE are documented for tracking & trending potential contamination control/worker practice issues.

Personnel Contamination Incident (PCI): A PCE where the initially identified radioactivity (excluding radon) concentration exceeds unrestricted release contamination limits or, any PCE where a potential intake

may have occurred (i.e., detectable facial contamination). Because of the potential client/regulatory implications, PCIs shall be reported by the RSO to the Project Manager, and the Project Certified Health Physicist (CHP).

Unrestricted Release: Release of equipment and / or material to the general public.

5.0 RESPONSIBILITIES

5.1 Radiation Safety Officer (RSO)

- Oversees implementation of this procedure, particularly personnel decontamination efforts and associated dosimetric assessments.
- Directs Project Personnel and provides guidance to Emergency Responders, during emergencies, in a manner that best minimizes the spread of radioactive contamination without interfering with life-saving action(s).
- Evaluates nuclear medicine studies/treatments reported by Project Personnel, determines whether a temporary withholding of Restricted Area access permissions is required, and consults with Project Management, as appropriate.
- Ensures the Project Manager and the Project CHP are notified of any PCI.

5.2 Radiation Protection Technician (RPT)

- Monitor access points to ensure proper frisking techniques are being used.
- Ensures RSO is notified of any PCI.
- Performs personnel monitoring if contamination is suspected by a worker or as a result of frisker alarm.
- Documents suspected-PCE response and associated actions taken.
- Performs personnel decontamination according to this procedure and RSO direction.

5.3 Project Supervisor

- Ensuring personnel under their direction comply with Radiation Protection requirements.
- Informing radiation and/or industrial hygiene personnel of any changes in work scope.

5.4 Project Personnel

- Notifies the RSO of any nuclear medicine procedure (diagnostic or therapeutic) where radionuclides are injected or ingested into the body. This notification should occur as early as possible (i.e., no later than immediately upon reporting to the work site after the procedure).
- Performs routine frisking upon exiting areas where monitoring is required in accordance with this procedure and RP direction.
- Immediately informs Radiation Protection (RP) of elevated frisker count rates, alarms, or suspected contamination.
- Does not attempt self-decontamination without RP present.
- Follows directions regarding radiological matters from RP.

6.0 PRECAUTIONS AND LIMITATIONS

- Individuals who have received a recent nuclear medicine procedure (diagnostic or therapeutic) can emit radiation and radioactive materials from their body. The short-lived radionuclides, typically beta-gamma emitters, used in nuclear medicine can cause false frisker alarms and create unnecessary radiation exposure to co-workers. The RSO must be notified of any nuclear medicine procedure in order to evaluate the radiological status of the affected worker(s).
- Poor frisking technique/conditions will cause contamination to not be detected. Alpha particles are particularly difficult to detect due to their limited travel distance (typically less than one inch in air) and ease in which they are shielded by dust, dirt, moisture, etc.
- Smears should not be used to determine contamination levels on the skin.
- Facial contamination is an indication of a possible intake and should be investigated further per RSO instruction.
- Areas under jewelry may concentrate contamination. If contamination is suspected, jewelry should be removed and appropriate surveys and smears taken.
- Surface contamination on clothing from radon daughters can be increased by environmental factors such as rain and rapid weather changes. Additionally, certain types of materials such as plastics and polyester tend to “attract” radon daughters due to the build-up of static charge.
- Skin decontamination techniques, if performed improperly, can cause injury to contaminated individuals.
- Decontamination efforts should be performed by RP of the same sex as the contaminated individual, if the efforts will potentially require exposing private body areas. If this is not possible, a witness, of the same sex as the individual, shall be present to observe and assist with decon efforts.
- Decontamination methods should limit the possibility of breaking the skin barrier. Use of hot water, harsh chemicals, abrasive materials and washing more than is advised below may open the pores and allow contamination that was superficial into the body.
- Any tools or solutions used to support personnel decontamination efforts shall be handled as potentially contaminated until evaluated and released by RP.

7.0 RECORDS

- Personnel Contamination Event Form (Attachment 1).
- Skin Dose Assessment Form (Attachment 2).
- Site RP Logbook(s).

8.0 PROCEDURE

8.1 RP Requirements for Access Control Point Frisker Set-Up and Operation

Except as directed by the RSO, RP shall establish Access Control Point Frisking Stations according to the following requirements:

- Ensure that frisker stations at Access Control Points are set-up and maintained in a manner that facilitates compliance with this procedure (i.e., frisker operational with probe face up and readily accessible at the step-off point on the “clean” side of the radiological boundary).
- In order to maintain instrument minimum detectable activities as low as possible, ensure areas where personnel monitoring will be performed have average background levels less than 100 cpm (beta-gamma frisker). The RSO should be contacted for guidance, if these background limitations are not achievable at the work site or with the equipment type in use.
- RP personnel assigned to a given work site shall verify frisker operations and alarm threshold set-points periodically during the work shift. The verification shall be documented in the work-site RP logbook.

8.2 Worker Requirements for Routine Exit Monitoring (Frisking)

1. Routine exit frisking may be performed by trained radiation workers.
2. Contact RP whenever a worker suspects a Personnel Contamination Event (PCE) has occurred, or under wet conditions.
3. Follow training instructions for the sequence of removal of Personal Protection Equipment (PPE) taking note of the following:
 - Prior to removing PPE and frisking, examine Anti-C PPE for any rips or tears. Take special care when frisking areas under the locations of rips or tears.
 - Prior to frisking, inspect personal clothing for signs of contamination (i.e., soiled areas). Take special care when frisking soiled areas that could be contaminated.
4. Using proper technique is essential to a good survey. Poor technique **will** cause contamination to not be detected. Observe these key points:
 - Before frisking, check the instrument switch settings (i.e., power (ON), response speed (SLOW), range setting (X1)). Report problems to RP.
 - Verify that the instrument, probe, and cable are free of physical damage that may affect instrument operation. Report problems to RP.
 - Use caution when handling the instrument and frisking to avoid damaging or contaminating the detector surface.
 - Probes should be held as close to the skin or clothing as possible without direct contact with the sensitive detector surface (i.e., within ¼-inch for Alpha detectors and ½-inch for Beta detectors). The detector surface is highly susceptible to physical damage and cross-contamination.
 - Frisking speed shall not exceed one probe width per second.
 - If possible, frisk bare hand prior to picking up probe.
 - Frisk any personal items that were handled while in the work areas (e.g., cell phones, clip boards, hard hats, traffic safety vests, safety glasses, etc.)

Commence whole-body frisk at the top of the head, working down the body to the bottoms of shoes/feet.

If counts above background are encountered, stabilize probe face over the suspected area for approximately ten seconds. If the count rate remains above normal background, or if the instrument alarms, immediately notify RP. Stay at the Access Control Point, if possible.

If no contamination is detected, replace the probe face up and exit the area. Switch instrument power OFF, if directed by RP.

8.3 Worker/RP Requirements for Exit Monitoring under Wet Conditions

Surveying under wet conditions is possible, but shall not be considered a routinely accepted activity. One of the primary purposes of establishing access control point shelters is to provide workers with a donning, doffing, and frisking area free of environmental exposure. If frisking is required under wet conditions, contact RP for guidance and to assist with frisking. RP will perform the following:

- Direct personnel to remove and examine Anti-C PPE for any rips or tears. If damage is found, ensure that the corresponding location on skin or personnel clothing is completely dry prior to frisking.
- Inspect personal clothing for signs of contamination (i.e., soiled areas). If contamination is suspected, ensure that the corresponding location on skin or personnel clothing is completely dry prior to frisking.
- Direct individual to dry exposed skin, hair, and clothing to the extent possible using a clean towel (cloth or paper).
- Perform a careful frisk concentrating on areas of greatest contamination potential. The use of a beta frisker is recommended, if available.
- Consider any detectable activity above background as an indicator of potential personnel contamination and contact the RSO for guidance.

8.4 RP Requirements for Responding to Suspected Personnel Contamination Events

1. Suspected Clothing Contamination

- Verify the presence of detectable contamination. If no activity above background is detected, release the individual.
- If activity above background is detected, contact the RSO for guidance. Depending on the activity levels and feedback from RP and the affected individual, the RSO may direct any of the following:
 - Evaluation of potential skin contamination.
 - Direct surface decontamination in a manner that prevents the uncontrolled spread of contamination or subsequent skin exposure.
 - Initiation of a PCE Report and/or Radiological Occurrence Report.
 - Survey and disposal of the clothing as radioactive waste.
 - A “hold-for-decay” process if radon is suspected:
 - 1) Survey clothing and record initial activity levels.
 - 2) Apply a static-release spray to the clothing, if available.
 - 3) Place article of clothing into a rad bag and seal.
 - 4) Wait up to 24 hours and resurvey clothing.
 - 5) If an appreciable reduction of radioactivity is noted, radon should be assumed. Notify the RSO and continue the decay process until all detectable activity has been eliminated. Then return the clothing to the individual and document initial/final readings and any actions taken in the site RP logbook. No further actions are required.

- 6) If no appreciable reduction of radioactivity is noted, initiate a PCE Report, a Radiological Occurrence Report, and contact the RSO for guidance and clothing disposition. If the post-decay radioactivity levels exceed the site "Average" contamination limits the RSO will make the appropriate notifications and initiate a skin dose assessment.

2. Suspected Skin Contamination

- Verify the presence of detectable contamination. If no activity above background is detected, release the individual.
- If activity above background is detected, contact the RSO for guidance. Depending on the activity levels and feedback from RP and the affected individual, the RSO may direct the following process:
 - Utilize an area that ensures personal privacy for the contaminated individual.
 - Identify all areas of contamination and initiate PCE documentation
 - Wipe the affected area with a damp towel or alcohol-free "baby" wipe.
 - Wash the affected area with hand soap and tepid water. Do NOT use hot water. Low pH soap such as Phisoderm, PhisoHex, or RadCon is recommended. Repeat a maximum two additional times. If washing hair, use a low pH shampoo, and avoid rinsing into facial areas. Use suitable low pH cleansers for face washing. A soft bristle brush suitable for skin scrubbing may be used during this process.
 - Damp swabs may be used by the individual being decontaminated to clean nasal passages. Potable water may be used to rinse mouth in the event of dust getting into the face. Eyewash solution may be used to wash contaminated dust or of eyes. Swabs used for nasal passage smears and water used to wash out mouth should be saved for analysis.
 - Perform a final release survey. If all detectable contamination has been removed, release the individual.
 - If decon efforts were unsuccessful, contact the RSO for additional guidance. The RSO may determine that additional decon efforts are not feasible or appropriate.
 - The RSO and contaminated individual shall concur before any hair cutting is performed.
 - Gather all necessary information to complete the PCE form and submit to the RSO for review and any necessary follow-up actions.
 - Save any decon rags or nasal swabs used in a radioactive material bag until directed to dispose of them by the RSO. Isotopic analysis of these items may be required.

3. Dosimetry Calculations

- The Project CHP and RSO shall cooperatively investigate, calculate, and document the following:
 - Estimated skin dose for any PCI. (Attachment 2 or equivalent)
 - Estimated intake for any facial contamination
- Ensure skin doses exceeding 100 mrem are included in individual exposure records.
- Collection of a fecal bioassay sample should be considered if facial contamination is identified. The optimal time for collection of a fecal sample is between the second and third day following a suspected intake.

4. Occurrence Recordkeeping

In addition to radiological surveys and logbook entries, the following documents shall be generated (based upon occurrence classification):

- Confirmed PCE
 - PCE Report
 - Radiological Occurrence Report
- Confirmed PCI
 - PCE Report
 - Radiological Occurrence Report
 - Skin Dose Assessment Form (or equivalent).

9.0 ATTACHMENTS

Note: Attachments may be revised without formal review of this procedure and are attached as examples only. Please contact the RSO for a current copy of these attachments.

- Attachment 1, Personnel Contamination Event Report
- Attachment 2, Skin Dose Assessment



Attachment 1

PERSONNEL CONTAMINATION EVENT REPORT (FRONT)

Name: _____ Site Badge#: _____ RWP No. _____

Employer: _____ Date _____ Time: _____ Location of Incident: _____

Description of Work being performed: _____

Description of Circumstances and the Suspected Cause _____

Skin Contamination Survey Summary

Body Location*	Initial Levels dpm/100cm ²	1st Decon Method	Attempt Results dpm/100cm ²	2ND Decon Method	Attempt Results dpm/100cm ²	3rd Decon Method	Attempt Results dpm/100cm ²
A							
B							
C							
D							

* Indicate location on back of form

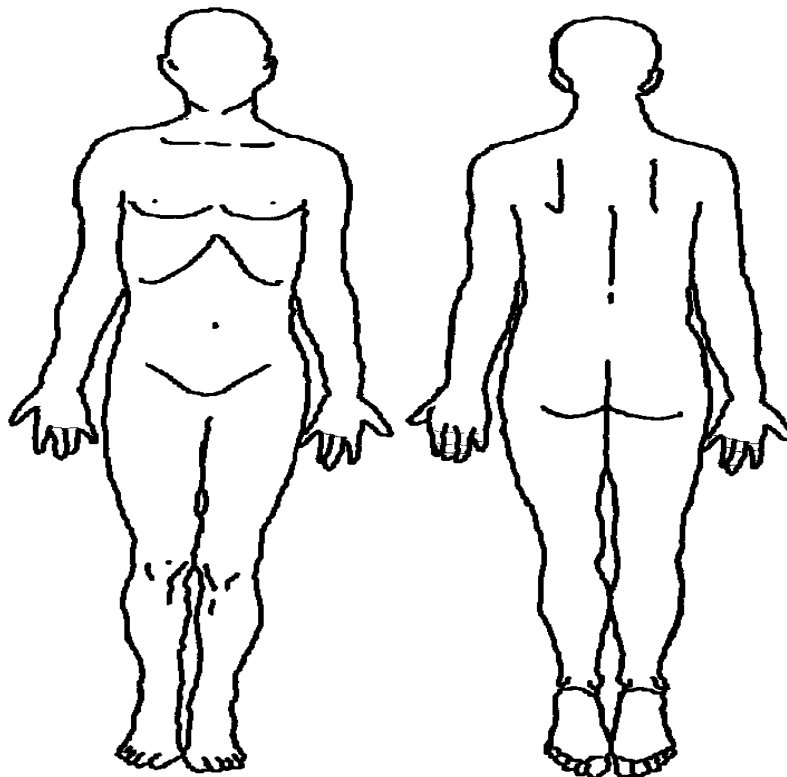
Nasal Swab Activity: Swab 1 _____ dpm/100 cm² Swab 2 _____ dpm/100 cm²Clothing Contamination Survey Summary

Item	Initial Levels dpm/100 cm ²	Decon Method	Final Results dpm/100 cm ²	Released to employee (Y/N)

Bioassay
☐ Scheduled / ☐ N/ASkin Dose
☐ Calculated / ☐ NAROR Follow-up
☐ Initiated / ☐ NAPotential for Intake?
☐ Yes / ☐ N_____
RSO_____
Date_____
RP Technician_____
Date

Attachment 1, Continued

PERSONNEL CONTAMINATION EVENT REPORT (Back of Form)



Comments and additional detail (identify by letter and include estimated area in square cm):

RP SURVEY INSTRUMENT(S) INFORMATION

Instrument Model	Serial Number	Cal. Due Date



Attachment 2

Attachment 2.

SKIN DOSE ASSESSMENT

NAME: _____ SITE BADGE# _____ RWP# _____

DATE/TIME of OCCURRENCE _____, of RELEASE _____

A. INITIAL DOSE EVALUATION

Body Location	Activity or Dose Rate (specify units)	Conversion Factor	Exposure Time (hours)	Dose Estimate (mrem)

B. Overall Dose Estimate _____

C. Comments:

D. Signature and Review

Calculated by: _____ Title: _____

Signature: _____ Date: _____

Reviewed by: _____ Title: _____

Signature: _____ Date: _____

ENSURE A COPY OF THIS FORM IS MAINTAINED WITH INDIVIDUAL'S EXPOSURE RECORDS

Appendix I
Contamination Control Plan

This page intentionally left blank

FINAL CONTAMINATION CONTROL PLAN

Remediation of Operable Units 1 and 2 – Former Harshaw Chemical Company Site, Cleveland, Ohio

Contract No. W912P424C0002

Delivery Order No. W912P423R0019

Date: April 29, 2024

Prepared for:



USACE Buffalo District

478 Main Street

Buffalo, New York 14202

Prepared by:



Enviro-Fix Solutions LLC

1240 Bayshore Highway, Suite 311

Burlingame, California 94010

Phone: 650-347-1555 / Fax: 650-347-8789

This page intentionally left blank.



TABLE OF CONTENTS

LIST OF TABLES	II
ACRONYMS	III
1.0 INTRODUCTION.....	1-1
2.0 SCOPE AND PURPOSE.....	2-1
3.0 RESPONSIBILITIES AND AUTHORITY.....	3-1
3.1 Project Manager (PM).....	3-1
3.2 Safety and Health Manager (SHM)	3-1
3.3 Site Safety and Health Officer (SSHO)	3-1
3.4 Radiation Safety Officer (RSO)	3-1
3.5 Site Superintendent	3-2
4.0 CONTAMINATION CONTROL PROGRAM	4-1
4.1 Contamination Control Zones	4-1
4.2 Housekeeping.....	4-4
4.3 Engineering Controls	4-4
4.4 Administrative Controls.....	4-4
4.5 Personal Protective Equipment (PPE)	4-5
4.6 Emergencies	4-5
5.0 MONITORING.....	5-1
5.1 Surface Contamination Monitoring	5-1
5.2 Air Monitoring	5-1
5.2.1 Perimeter Air Monitoring	5-2
5.2.2 Work Area Air Monitoring.....	5-3
5.2.3 Meteorological Monitoring.....	5-3
5.2.4 Sample Designation and Sample Identification Codes	5-4
5.2.5 Instrument/Equipment Testing, Inspection, and Maintenance.....	5-4
5.2.6 Response Actions to Elevated Results	5-5
5.2.7 Documentation and Records.....	5-5
5.2.8 Reporting.....	5-6
5.2.9 Training.....	5-7
6.0 SURVEYS, DECONTAMINATION, AND RELEASE	6-1
7.0 LIMITS	7-1
8.0 REFERENCES.....	8-1



LIST OF TABLES

Table 5-1.	Equipment Maintenance Schedule.....	5-4
Table 7-1.	Air Monitoring Limits.....	7-1
Table 7-2.	Radiological Screening Levels for Clearance.....	7-2



ACRONYMS

ACGIH	American Conference of Governmental and Industrial Hygienists
AHA	Activity Hazard Analysis
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
APP	Accident Prevention Plan
Bq	becquerel
BZ	Breathing Zone
CCP	Contamination Control Plan
CFR	Code of Federal Regulations
cm ²	square centimeter
COR	Contracting Officer's Representative
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration
EA	Exposure Assessment
EFS	Enviro-Fix Solutions LLC
EM	Engineer Manual
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
FEDMS	FUSRAP Environmental Data Management System
FSS	Final Status Survey
FUSRAP	Formerly Utilized Sites Remedial Action Program
g	gram
HCCS	Harshaw Chemical Company Site
HEPA	High-Efficiency Particulate Air
HPS	Health Physics Society
μCi	microcurie
m ³	cubic meter
mg	milligram
mL	milliliter
NCRP	National Council on Radiation Protection
NEA	Negative Exposure Assessment
NESHAP	National Emission Standards for Hazardous Air Pollutants
OH	Ohio
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
Pb	Lead
pCi	picocurie
PM	Project Manager
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
Ra	Radium
RCF	Radiological Counting Facility
RG	Remedial Goal



ROC	Radionuclide of Concern
RPP	Radiation Protection Plan
RSO	Radiation Safety Officer
RWP	Radiation Work Permit
SAP	Sampling and Analysis Plan
SHM	Safety and Health Manager
S.I.	International System of Units
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SZ	Support Zone
Th	Thorium
TSP	Total Suspended Particulate
U	Uranium
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
WAC	Waste Acceptance Criteria
WWTS	waste water treatment system



SIGNATURES

This Final Contamination Control Plan (CCP) has been prepared by Enviro-Fix Solutions (EFS) for the former Harshaw Chemical Company Site Remediation of Operable Unit 1 and Operable Unit 2, Cleveland, Ohio (OH) Project. Work conducted under this contract will be performed in accordance with applicable federal, state, and local safety and occupational health laws and regulations including Occupational Safety and Health Administration (OSHA) standards, including 29 Code of Federal Regulations (CFR) 1910 and 1926, and the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, 15 November 2014). The contents of this CCP are subject to review and revision as new information becomes available.

Plan Preparer:

<i>Scott Walnicki</i>	6/3/2024	201-965-9099
Scott Walnicki, CHP	Date	Phone

Plan Approver:

<i>Eric Laning</i>	6/3/2024	865-251-2075
Eric Laning	Date	Phone
Vice President of Health Physics Services		

Plan Concurrence:

Rick Woodworth <small>Digitally signed by Rick Woodworth Date: 2024.06.03 10:11:49 -04'00'</small>	6/3/2024	215-776-0629
Rick Woodworth	Date	Phone
Sr. Project Manager		

This page intentionally left blank.



1.0 INTRODUCTION

Enviro-Fix Solutions, LLC (EFS) has prepared this plan for the United States Army Corps of Engineers (USACE) – Buffalo District under Contract Number W912P424C0002, to conduct remedial activities at the former Harshaw Chemical Company Site (HCCS) located in Cleveland, Ohio (OH). The HCCS is included in the government's Formerly Utilized Sites Remedial Action Program (FUSRAP). The planned remedial activities include removal and off-site disposal of radiological and/or chemical contaminated soil and debris (pavement and foundations). Radiologically impacted groundwater, stormwater, and construction water will be processed onsite in the wastewater treatment system (WWTS) to manage radionuclides.

This final plan describes the overall contamination control approach to be implemented during remedial activities at the site, to include pre-mobilization, excavations, material handling, building foundation investigations, demobilization, and provides specific details on the means and methods EFS will apply to ensure contaminants are identified and controlled such that exposures from hazardous materials to the workforce, public, and the environment are maintained as low as reasonably achievable (ALARA).

This page intentionally left blank.



2.0 SCOPE AND PURPOSE

The scope of this Contamination Control Plan (CCP) is specific to the remedial activities planned for the HCCS Remediation of Operable Units (OU) 1 and 2 with detailed guidance for controlling the potential spread of chemical and radiological contamination within the site and off-site areas. This CCP outlines the following methods used for controlling contamination on the site and preventing chemical and/or radiological cross-contamination to the site Support Zone (SZ) or outside the HCCS boundaries:

- Conspicuously posting hazardous work areas and Exclusion Zones (EZ) and controlling access/egress to those work zones from the EZ through the Contamination Reduction Zone (CRZ);
- Implementing a routine survey and inspection schedule to continually document site conditions and provide ongoing monitoring of contamination levels;
- Radiologically surveying and decontaminating as necessary prior to releasing equipment and materials;
- Appropriately packaging all waste materials prior to leaving the site;
- Maintaining positive housekeeping of work areas and SZs;
- Verifying compliance with housekeeping and release limits;
- Controlling airborne emissions of dust and radionuclides during site operations through engineering controls; and
- Quantifying limits for airborne emissions of dust and radionuclides;
- Summarizing the monitoring requirements and procedures for contamination control and for measuring airborne emissions on-site and from the site.

This page intentionally left blank.



3.0 RESPONSIBILITIES AND AUTHORITY

3.1 Project Manager (PM)

The PM is responsible for providing logistical and policy support to ensure the requirements within the CCP are properly implemented.

3.2 Safety and Health Manager (SHM)

The SHM reports to the EFS corporate health and safety manager. The SHM is responsible for the overall conduct of the safety program for the HCCS project, including the CCP as integral component of worker and off-site receptor safety. The SHM provides technical support to the Site Safety and Health Officer (SSHO) and Radiation Safety Officer (RSO) as necessary when implementing this CCP. The SHM ensures that an independent review of work practices, engineering controls, and monitoring results is performed during remediation activities at the project site.

3.3 Site Safety and Health Officer (SSHO)

The project SSHO reports directly to the SHM. The SSHO works with the RSO to identify engineering controls and work practices that will improve the effectiveness of the CCP. The SSHO is responsible for ensuring that all elements of the approved Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP) are implemented and enforced on-site, including the performance of work area and perimeter total suspended particulate (TSP) monitoring and reporting requirements. The SSHO ensures that a periodic review of engineering controls, work practices, and monitoring results is performed to assess program effectiveness for non-radiological contamination controls. In addition, the SSHO obtains a qualified Industrial Hygienist to periodically review the contamination control program, independently assess its effectiveness, and perform Negative Exposure Assessments (NEAs).

3.4 Radiation Safety Officer (RSO)

The RSO reports directly to the program CHP and is responsible for implementing the Radiation Protection Plan (RPP) at the HCCS project including the performance of work area and perimeter radiological air monitoring and reporting requirements. The RSO is responsible for ensuring that the contamination control and measurement requirements of the CCP are performed at the



designated frequency and are of sufficient quality and quantity to identify the potential spread of contamination. The RSO ensures that a weekly review of engineering controls and work practices, and daily review of monitoring results is performed to assess program effectiveness for radiological contamination control.

3.5 Site Superintendent

The Site Superintendent works with the RSO and SSHO to identify engineering controls and work practices that will improve the effectiveness of the CCP. Together they implement the engineering controls and work practices needed to ensure that the CCP is executed effectively. While either the RSO or SSHO may identify methods to improve contamination control practices, it is the site superintendent who ensures that project supervision and subcontractor management incorporate into project work plans the contamination control measures specified in this CCP.



4.0 CONTAMINATION CONTROL PROGRAM

Hazard identification is the basis for implementing effective contamination controls. EFS will implement Standard Operating Procedures (SOPs) to effectively characterize areas and materials impacted with radiological/chemical/metals contamination, control access to these areas/materials, and use appropriate and practical engineering and administrative controls during excavation and soil handling activities. EFS implements work practices to prevent unnecessary contact with contamination, using properly trained and qualified staff, conducting routine monitoring for contamination, developing controlling work documents such as Activity Hazard Analyses (AHAs) and Radiation Work Permits (RWP), using Personal Protective Equipment (PPE), controlling movement of heavy equipment/vehicles, performing decontamination, and unconditional release surveys prior to site demobilization.

The primary concern for cross-contamination of the SZ and offsite areas is through movement of personnel, equipment, materials, and airborne emissions during remedial activities. The effectiveness of the contamination control program will be assessed through implementation of a routine radiological survey schedule outlined in the RPP, including surface wipe samples to determine contamination levels. Removable radioactivity surface wipe sampling will identify contamination in a timely manner to help minimize the spread of contamination and ensure potential contamination is addressed immediately. Surface wipe samples will be analyzed at the on-site Radiological Counting Facility (RCF).

4.1 Contamination Control Zones

The HCCS will be delineated with applicable Occupational Safety and Health Administration (OSHA) defined zones including the SZ, CRZ, and EZ (see example layout on **Figure 4-1**). The SZ will contain USACE and EFS office trailers, a RCF trailer, wash stations, and vehicle parking and storage. The SZ is generally considered to include all areas of the site not identified as an EZ or CRZ. The transition from SZ to CRZ will be through an access control point with changing areas for donning of PPE. The EZ will, in general, encompass excavation areas and investigation areas within the identified radiological and chemical impacted excavation areas as shown on **Figure 4-1**. All work which involves ground disturbance, including foundation disturbance, will occur within an EZ; this includes excavations as well as foundation, Waste Acceptance Criteria (WAC), and Final Status Survey (FSS) sampling activities. Exiting from the EZ will be through an



access control point for doffing PPE, radiological monitoring, and personnel decontamination if necessary.

Within the EZ there will also be radiologically controlled areas. These areas will be conspicuously posted with appropriate signage (e.g., Radioactive Materials Area) and have additional controls for worker safety. Movement of contaminated equipment and waste from one zone to another (e.g., from the EZ to CRZ) must be coordinated with the SSHO and RSO. Personnel and equipment will transition from the CRZ to SZ through an access control point with a decontamination station.

Figure 4-1 is provided for illustrative purposes only; specific EZ and CRZ boundaries will be established and adjusted as work progresses across the site. All control zone boundaries, including initial proposed boundaries, will require the preparation and submission of an Exposure Assessment (EA) report. Additionally, all downgrading of control zones or rezoning of support areas will be supported by an EA report to document justification for the downgrade/rezoning. These EA reports will be in a letter report format and include:

1. a narrative section to discuss the purpose and goal of the EA;
2. a summary of the supporting data results including air monitoring, contamination control, and soil sample results;
3. an evaluation of similar exposure scenarios, exposure control measures and environmental conditions during data collection, sampling and analytical methods;
4. a statistical analysis of the results, data summaries and conclusions;
5. an evaluation of the worst-case scenario exposure control measures and verification sampling requirements;
6. an attachment showing calculations, data tables, and maps of the current and/or proposed layout of the EZ, CRZ, and SZ; and
7. a description of proposed changes and/or the new EZ, CRZ, and SZ locations.

In general, EZs and CRZs will be established for each remedial area as the first step in the remedial process prior to ground disturbance and will be of sufficient size to encompass the Class 1 and Class 2 areas as well as to allow for the movement of heavy equipment. Following successful remediation, as determined by FSS that demonstrate satisfaction of remedial goals (RGs), areas will be down-posted to allow for backfilling operations to continue without EZ/CRZ restrictions.

Refer to the HCCS FUSRAP Project SOP #3, *Exposure Assessment Report to Establish Control Zones* (from Technical Scope, USACE 2022), for additional details along with data and reporting requirements.

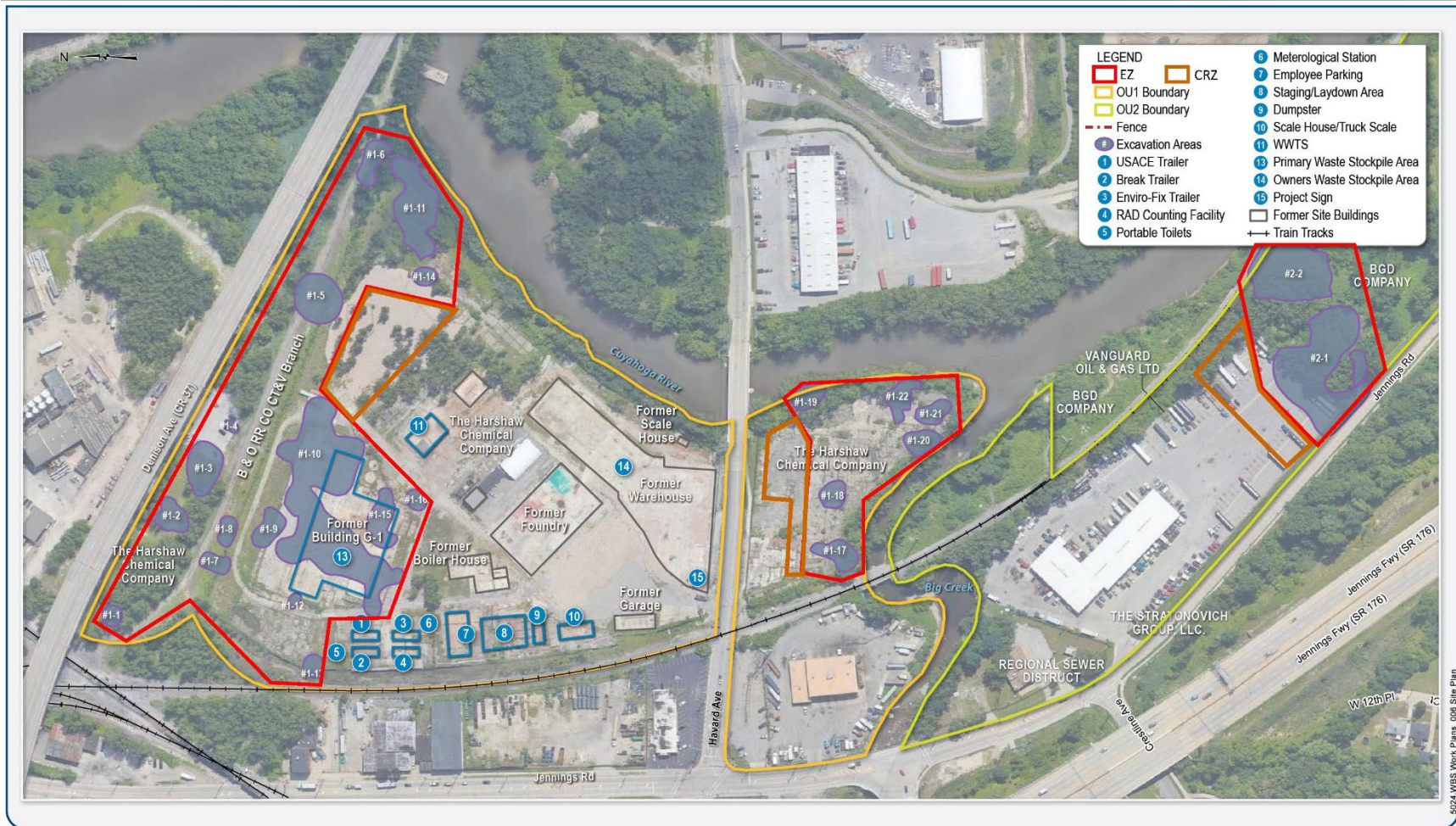


Figure 4-1. Example Layout of Contamination Control Zones



4.2 Housekeeping

Routine cleaning of surfaces within the CRZ and EZ will be necessary to reduce the potential for contamination spread, since these areas are the most likely places from which contamination can spread. Routine monitoring for contamination will be performed (see Section 5.0) for all areas of the site (EZ, CRZ and SZ) and if action levels are exceeded (see Section 7.0) then decontamination and a follow-up survey to confirm the area or equipment is below criteria, are required.

The contractor will clean equipment and materials using a combination of dry and wet methods, high-efficiency particulate air (HEPA) vacuuming, a tacky cloth, or other method that lessens the generation of airborne contaminants. All waste will be appropriately managed as contaminated waste, including waste generated from any dry decontamination methods. Contamination monitoring will take place after cleaning to ensure appropriate levels have been achieved, or additional cleaning/controls will be implemented.

4.3 Engineering Controls

To minimize exposure to contamination, engineering controls are designed into work activities whenever appropriate. Dust control (water) will be the primary means for controlling potential spread of airborne contamination. Options for engineering controls include but are not limited to:

- Use of decontamination pads
- Use of cleaning stations
- Decontamination of surfaces before disturbance;
- Use of wetting agents during activities that may produce dust;
- Use of surfactants/encapsulation; and
- Critical barriers to isolate sources of airborne contamination.

Dust control within excavation areas will be accomplished using a clean-water truck. A water truck will provide dust suppression for the haul roads and unpaved parking areas. EFS waste management personnel will monitor for free standing liquids and manage approved absorbent materials sufficient for the water generated during dust suppression.

4.4 Administrative Controls

Administrative controls will consist of:

- Training and qualifying personnel commensurate with their duties and the hazards they are



likely to encounter;

- Setting up access control points with appropriate signage and postings to warn personnel of entry into hazardous areas; and ensuring entry/exit protocols (e.g., doffing PPE and performing frisking of personnel and equipment) are adhered to;
- Pre-Job briefings and daily toolbox meetings to discuss the authorized tasks for a given day;
- AHAs and RWPs that describe the safety controls and PPE requirements to be employed for a specific task;
- Identification and discussion of work practices to minimize contact with contaminants such as avoiding kneeling or sitting in contaminated areas; and
- Limiting the number of personnel in a work area to the minimum needed to complete the task safely.

4.5 Personal Protective Equipment (PPE)

PPE will be prescribed for use in areas where radiological and/or chemical contamination may contact workers' skin or eyes, including areas with airborne contamination. Both reusable PPE such as Hard Hat and Safety Glasses, and single use disposable PPE such as Tyvek coveralls and Nitrile gloves will be utilized when necessary. Donning and doffing of PPE will be in accordance with protocols established in the APP/SSHP and RPP.

Chemically contaminated or radiologically contaminated PPE and clothing is handled in a manner to prevent cross-contamination during doffing. Once removed, single use disposable PPE will be placed immediately into bags at the change area for disposal (no reuse or additional handling).

Downgrading of PPE is generally not anticipated for work activities; however, any downgrading of PPE must be approved by USACE and requires a NEA report be completed and submitted prior to PPE downgrades. The NEA report shall be prepared in accordance with the *HCCS FUSRAP Project SOP #2, Negative Exposure Assessment Report to Downgrade PPE for Specific Activity* (from Technical Scope, USACE, 2022).

4.6 Emergencies

Guidance regarding responses to emergencies at the site is provided in the project APP/SSHP. Administrative and physical contamination controls will be suspended as necessary in the event emergency response personnel are deployed as a result of serious injury or weather-related emergencies. After the immediate emergency situation has been addressed, follow up investigations will be performed as necessary to determine if potential spread of contamination may have occurred, and to determine corrective actions as needed.

This page intentionally left blank.



5.0 MONITORING

5.1 Surface Contamination Monitoring

Surface contamination control measurements will be performed on/for:

- Trucks when they leave the EZ and the CRZ;
- SZ trailers, including office trailers (routine surveys);
- Materials and equipment leaving the EZ and the CRZ;
- Waste containers exiting the EZ, CRZ, and SZ;
- Individuals exiting the EZ;
- EZ and CRZ egress locations including access control point (routine surveys);
- Incoming construction equipment;
- Roadways and decontamination pads (routine surveys); and
- Office trailers and on-site RCF (routine surveys).

The primary means for surface contamination monitoring will be wipe samples to identify removable contamination. Direct radiation measurements will also be performed. The frequency of routine surveys will be daily/weekly/monthly based on the activities, potential for contamination, and frequency of housekeeping. Typical routine survey frequencies are listed below:

- Daily Routine Surveys: active work areas and access/egress points;
- Weekly Routine Surveys: offices and break areas, parking lots, RCF; and
- Monthly Routine Surveys: onsite haul routes/traffic patterns and site access point(s).

In addition, baseline radiological surveys for removable and fixed contamination will be performed on materials and equipment upon mobilization to the site. These surveys will be performed to demonstrate that such items have not been contaminated at another location before use. Conversely, all equipment being demobilized from the site will undergo an unrestricted release survey for removable and fixed contamination.

5.2 Air Monitoring

The air monitoring requirements are designed to provide early detection of potential emission of site contaminants. Air monitoring will be performed at the site perimeter and within work areas to assess airborne radioactivity and total suspended particulate (TSP) dust levels. Refer to the Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP)/Sampling and Analysis Plan (SAP) for air monitoring SOPs.



Air monitoring at the site perimeter will consist of low-volume radiological particulate collection and analysis; and real-time electronically linked TSP monitoring systems. Radionuclides, TSP, and on-site meteorological station data will be used to assess and establish baseline conditions (background) as well as to interpret/verify conditions during remedial activities.

Work area monitoring consists of a combination of radiological particulate and total suspended particulate (TSP) dust monitoring. If there is an exceedance of TSP limits in a monitor upwind of operations, the exceedance and the wind direction will be logged and work will continue. If there is an exceedance in both the upwind and downwind samplers with similar concentrations, it will be noted and work will continue. If there is an exceedance of TSP limits at a downwind location but not in the upwind location and emission-generating activities are scheduled to continue, additional dust controls will be implemented.

5.2.1 Perimeter Air Monitoring

Perimeter air sampling will be performed at the site perimeter to measure airborne particulate and TSP concentrations resulting from excavation, soil-handling and general site work activities.

A minimum of four perimeter air monitoring stations will be installed to measure radionuclides and total suspended particulate (TSP). Each station is outfitted with a HI-Q Model PSU-2 low volume continuous flow sampler for radionuclides; and Aeroqual Dust Sentry real-time monitoring systems for TSP. The PSU-2 samplers will be installed on stands and placed at breathing zone height (approximately 5 feet above the ground surface) at locations approximating each of the four cardinal directions (specific locations to be determined). The Dust Sentry TSP units will be set-up on tripod stands. The locations will be selected based on the proximity of remediation activities to the site perimeter as well as meteorological and other practical considerations.

Perimeter air monitoring will be performed continuously 24 hours per day, 7 days per week during site remediation activities. Radiological air samples will normally be changed out weekly; but the sampling period may be adjusted as needed in consideration of holidays or adverse weather conditions that prevent weekly sampling change-out. The filters collected for gross alpha/beta radionuclide analysis will be screened onsite for gross alpha and gross beta and will be compiled monthly and, if the gross alpha or gross beta limit values are exceeded, will be sent off-site for analysis of the individual radionuclides of concern (ROCs) including radium (Ra)-226, thorium (Th)-230, Th-232, and uranium (U)-238.



5.2.2 Work Area Air Monitoring

On-site monitoring of work areas will be performed during excavation and soil handling activities.

The portable monitoring stations will consist of the following equipment:

- SKC Leland Legacy Air Sampling Pumps, or equivalent (alternatively, the project may use F&J Specialty Products, Inc., LV-1 Environmental Low-Volume Air Sampler, or equivalent) and
- DustTrak DRX 8533 aerosol monitor, or equivalent.

Each active excavation area will be supported with a combination of dust monitoring for TSP; and low volume particulate monitoring for radiological constituents. Dust monitoring will be accomplished using three real-time DustTrak DRX 8533 aerosol monitors, or equivalent positioned upwind, downwind, and crosswind of the excavation. In addition, a minimum of one SKC Leland Legacy (or the F&J Model LV-1 alternative) or equivalent will be stationed within the excavation area to monitor radioactive particulate in order to confirm radiological posting requirements, PPE, and positive engineering controls.

The air filters from each low-volume air sampler will be changed daily. After a 72-hour waiting period for radon decay, the filters will be analyzed for gross alpha/beta radioactivity. These filters will be saved for potential analysis of individual radionuclides (Ra-226, Th-230, Th-232 and Total U), depending on the results of the gross alpha/beta analysis (i.e., any that are above screening limits).

The real-time TSP monitors will be equipped with data loggers to measure the maximum 15-minute air concentrations of TSP.

The locations of the portable monitors will be selected by the SSHO daily, using careful consideration of current and forecasted meteorological conditions and scheduled activities for the day. The location of each portable station, the work zone(s), and wind direction will be recorded for each day. Exceedances of response or action limits for any ROCs must be immediately reported to the SSHO, PM and the USACE Contracting Officer's Representative (COR).

5.2.3 Meteorological Monitoring

A meteorological station (Davis 6152 Vantage Pro2 or equivalent) equipped with wired AC power adapter and battery backup for remote operation is placed within the planned SZ. The system measures wind speed, temperature, wind direction, relative humidity, and barometric pressure. The



system will record 15-minute average values for each parameter (wind speed and direction, temperature, relative humidity, and barometric pressure) and the data will be maintained in an on-site database. Additionally, the station has a rain gauge to determine inches of rain in a 24-hour period. The station can operate without line power supply using battery backup, thereby supporting uninterrupted operation of the station. The station is also designed with wireless capability for data upload.

5.2.4 Sample Designation and Sample Identification Codes

Samples collected will be assigned unique sample identification numbers as established in the QAPP/SAP. These numbers are necessary to identify and track each of the samples collected for analysis during completion of the project. In addition, the sample identification numbers will be used to identify and retrieve the analytical results received from the laboratory as well as other data related to the sample.

5.2.5 Instrument/Equipment Testing, Inspection, and Maintenance

Table 5-1 identifies the equipment and maintenance required to ensure system operability. Calibration and maintenance frequencies must be in accordance with manufacturer requirements and the project UFP-QAPP/SAP.

Table 5-1. Equipment Maintenance Schedule

System/Component	Maintenance Activity	Frequency	Responsibility
Personal sampling pumps (e.g., Gil-Air 5)	Flow rate calibration	Daily	Site
	Calibration	Annual	Vendor
	Check sample heads for contamination	Quarterly	Site
Low-volume sampler (Hi-Q PSU-2, SKC Leland Legacy or F&J Specialty Products, Inc., LV-1)	Flow rate verification/calibration	Daily	Site
	Calibration	Annual	Site
	Check sample heads for contamination	Quarterly	Site
Real-time total suspended particulate monitor (Aeroqual Dust Sentry)	Flow rate check	Daily	Site
	Calibration	Annual	Vendor
Portable total suspended particulate monitor (TSI DustTrak DRX 8533)	Flow check (three points)	Monthly	Site
	Calibration	Annual	Vendor
Meteorological instruments (Davis 6152 Vantage Pro2)	Calibration	Semiannual	Vendor
Air flow calibrator	Calibration	Annual	Vendor
Portable Ludlum ratemeters and	Quality Control Checks	Daily	Site



System/Component	Maintenance Activity	Frequency	Responsibility
scales in RCF	Calibration	Annual	Vendor

5.2.6 Response Actions to Elevated Results

In the event of an elevated air monitoring result that shows action levels or limits are approached or exceeded, field personnel will notify the SSHO at the time of the observation (i.e., real time). The SSHO will compare the sample results against the action levels and limits in **Table 7-1** for the appropriate sampling location. The meteorological data (e.g., wind direction/speed, temperature, humidity) should be evaluated as part of this response. In addition, adjacent off-site activities (e.g., agricultural, vehicle traffic) and where the site activities are occurring should also be considered as part of this response. If action levels or limits are exceeded, perform the following:

- Review the preliminary data and promptly suspend, or, for action level exceedance, modify operations;
- For limit exceedance, promptly review notification requirements to determine if notification of off-site personnel and organizations is required;
- Promptly investigate the cause of the event and determine if mitigation is required, ensuring that all potential on-site sources are adequately investigated;
- Document events caused by non-site-related sources, such as wildfire, high humidity affecting the instruments, exhaust emissions from operating equipment, or other factors unrelated to the site activity; and
- If the situation requires any mitigation, document the event and summarize the data, the cause of the measured value(s), and any corrective measures implemented as a result of the event.

As the work progresses and more data are gathered to allow a full understanding of the relationship between site operations and contamination-producing activities, EFS may, in consultation with the USACE, revise these response actions, as appropriate.

5.2.7 Documentation and Records

5.2.7.1 *Field Log*

Throughout the performance of the project, EFS will maintain field logs. Information to be recorded in these logs/forms include:

- Radio-analytical sample throughput and quality control information related to operation of onsite RCF;
- A description of remediation activities associated with any elevated air monitoring measurements;
- Locations of each fixed and portable air monitoring station and handheld monitoring locations for the day;



- Any corrective actions conducted due to elevated real-time air monitoring concentrations;
- Sample media collection and receipt dates, conditions, and numbers;
- Sampling equipment installation, operation, and removal dates;
- Sampling equipment calibration dates and results;
- General weather conditions;
- Any unusual situations that may affect the samples or sampling; and
- Start and stop times.

5.2.7.2 *Data Management*

Air monitoring data will be obtained from a variety of sources, including real-time monitoring, handheld and observational monitoring, particulate sampling, and laboratory analyses. EFS will evaluate, verify, and submit to USACE these data at monthly intervals. The following measurements and information will be included air monitoring reports:

- Real-time TSP at site perimeter and portable monitoring locations (datalogger);
- Filter samples for radionuclides (gross alpha/beta) at fixed and portable monitoring locations;
- Filter samples for individual radionuclides (Ra-226, Th-230, Th-232, and U-238) at fixed and portable monitoring locations;
- Handheld real-time particulate matter at portable monitoring locations;
- Personal air monitors; and
- Real-time meteorological parameters at meteorological monitoring location (datalogger).

5.2.8 Reporting

5.2.8.1 *Exceedances*

Monitoring results will be immediately reported to the PM, RSO, SSHO, and the USACE (i.e., COR and resident engineer) when action levels and/or limits have been exceeded, to allow prompt evaluation and response to potential emissions.

The RSO, SSHO, and PM, in consultation with USACE, will decide when shutdown and startup criteria have been met.

5.2.8.2 *Monthly Data Summaries*

EFS will provide to USACE the following monthly data summaries as a letter report in electronic format for the fixed perimeter monitoring stations and portable monitoring stations:

- Narrative describing and discussing the data collection period, sampling methodology, analytical methods and laboratory qualifications along with an evaluation of work area results and perimeter results relative to their respective action level and limit values. The narrative should also address any exceedances, root cause evaluations, and corrective actions taken in response to exceedances;



- Data plots showing perimeter radionuclide and TSP concentrations versus time and compared to action levels and limits;
- Data plots showing work area concentrations versus time and compared to action levels and limits;
- Results of personal air monitoring
- Action level and limit summary tables;
- Figures showing the locations of monitoring stations (daily or as required to capture each unique location);
- Meteorological data summary table.

In addition to monthly air data summaries, monthly data summaries of contamination control results (i.e., surface sample results) will also be provided.

5.2.8.3 *Other Reports*

EFS will provide USACE with an air monitoring report at the conclusion of the perimeter air monitoring program. The report shall provide:

- All filter sampling and analytical results in a database or spreadsheet (note that analytical data will also be entered into the USACE FUSRAP Environmental Data Management System [FEDMS]). These will include statistical summaries (tabulated mean, standard deviation, percentiles by monitor location and month) and graphical summaries;
- All meteorological data in a database or spreadsheet. These will include statistical summaries (tabulated mean, standard deviation, percentiles by monitor location and month) and graphical summaries (such as boxplots by monitor location and month);
- A summary of air monitoring results above the action levels and limits, corresponding site activities, and response actions taken;
- Figures that identify fixed and portable air monitoring stations associated with each remediation area.

5.2.9 Training

The PM will ensure that the following instructions specific to this project have been presented to site project personnel implementing this plan:

- Overview of the air monitoring plan;
- Organization responsibilities, lines of communication, and authorities;
- Sample handling and chain of custody;
- Quality control considerations;
- Documentation requirements;
- Response actions; and
- Notification requirements.

This page intentionally left blank.



6.0 SURVEYS, DECONTAMINATION, AND RELEASE

Detailed personnel decontamination procedures will be provided in the APP/SSHP. A decontamination line will be set up in the CRZ. Workers will exit the EZ through the CRZ and properly decontaminate themselves as specified in the APP/SSHP. Before exiting to the SZ, workers will survey for radiological contamination after removing outer PPE to assess the effectiveness of contamination control measures.

Vehicles and large equipment used in the EZ will be decontaminated on a decontamination pad. Tools and small equipment may be decontaminated in the EZ prior to transfer to the CRZ. Surveys will be performed on tools and equipment prior to transfer from the EZ or CRZ into the SZ to ensure release limits have been met.

Before release from the EZ, waste containers will be visually inspected and surveyed for contamination. If contamination is detected during release survey, then additional decontamination will be performed before a new release survey is conducted. All waste containers will be verified to ensure release limits have been met before they are released from the EZ.

This page intentionally left blank.



7.0 LIMITS

Air monitoring limits are tiered based on the location, as shown in **Table 7-1**.

Table 7-1. Air Monitoring Limits

Contaminant of Concern	Location	Action Level	Limit	Units	Reference
Respirable particles not otherwise specified (TSP)	Work area/Breathing Zone (BZ)	1.5	3	mg/m ³	1
Radioactivity, gross alpha	Work area/BZ	1.5E-13	5.0E-13	μCi/mL	2
Radioactivity, gross alpha	Perimeter	8.0E-16	4.0E-15	μCi/mL	2
Radioactivity, gross beta	Work area/BZ	3.0E-11	1.0E-10	μCi/mL	3
Radioactivity, gross beta	Perimeter	1.2E-13	6.0E-13	μCi/mL	3
Ra-226 derived air concentration (DAC)	Work area/BZ	9.0E-11	3.0E-10	μCi/mL	4
Ra-226	Perimeter	1.8E-13	9.0E-13	μCi/mL	4
Th-230 (DAC)	Work area/BZ	9.0E-13	3.0E-12	μCi/mL	4
Th-230	Perimeter	4.0E-15	2.0E-14	μCi/mL	4
Th-232 (DAC)	Work area/BZ	1.5E-13	5.0E-13	μCi/mL	2
Th-232	Perimeter	8.0E-16	4.0E-15	μCi/mL	2
Total U (DAC)	Work area/BZ	6.0E-12	2.0E-11	μCi/mL	4
Total U	Perimeter	1.2E-14	6.0E-14	μCi/mL	4

μCi/mL denotes microcuries per milliliter.

References:

1. American Conference of Governmental Industrial Hygienists (ACGIH) recommendation of 3 milligrams per cubic meter (mg/m³) for total respirable particulates with an action level of 1.5 mg/m³, 50% of the recommended limit for PM-10.
2. 10 CFR 20, Appendix B, values for Th-232, Class W used as most conservative surrogate for alpha activity. DAC, occupational value for inhalation, assumes exposure limited to 2,000 hours/year. Most conservative inhalation properties assumed of radionuclide, controls dose to the public, annual average. DAC Action level set to 30% of limit; effluent action level set to 20% of limit.
3. 10 CFR 20, Appendix B, values for lead (Pb)-210, Class W used because it is the long-lived beta-emitting radionuclide with the most restrictive occupational and effluent limits. DAC, occupational value for inhalation, assumes exposure limited to 2,000 hours/year. Most conservative inhalation properties assumed of radionuclide, controls dose to the public, annual average. DAC Action level set to 30% of limit; effluent action level set to 20% of limit.
4. 10 CFR 20, Appendix B, limiting values for individual radionuclides, effluent limit for annual dose to the public, annual average, action level at 20% (ALARA requirement). DAC Action level set to 30% of limit. For Total U, values based on U-235 Class Y as most conservative among U isotopes.

Radiological limits for acceptable levels of surface contamination are presented in Table 7-2 and are applied to equipment and material release.



Table 7-2. Radiological Screening Levels for Clearance

Radionuclide Groups^{1,2}	Screening Levels³ S.I. Units (Bq/cm² or Bq/g)⁴	Surface Screening Levels³ Conventional Units (/100 cm²)	Volumetric Screening Levels³ Conventional Units (pCi/g)
<u>Group 1</u> Radium, Thorium, and Transuranics: Po-210, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, Np-237, Pu-239, Pu-240, Am-241, Cm-244, and associated decay chains, and others ^{1,5}	0.1	600	3
<u>Group 2</u> Uranium and selected high-dose beta- gamma emitters: Na-22, Mn-54, Co-58, Co-60, Zn-65, Sr-90, Nb-94, Ru-106, Ag-100m, Sb-124, Cs-134, Cs-137, Eu-154, Ir-192, U-234, U-235, U-238, natural uranium, and others ^{1,6}	1	6,000	30
<u>Group 3</u> General beta-gamma emitters: Na-24, Cl-36, Fe-59, Cd-109, I-131, I-129, Ce-144, Au-198, Pu-241, and others ¹	10	60,000	300
<u>Group 4</u> Other beta-gamma emitters: H-3, C-14, P-32, S-35, Ca-45, Cr-51, Fe-55, Ni-63, Sr-89, Tc-99, In-111, I-125, Pm-147, and others ¹	100	600,000	3,000

Notes:

1. To determine the specific group for radionuclides not shown, a comparison of the effective dose factors by exposure pathway (see Table A.1 of National Council on Radiation Protection Measurements [NCRP] Report No. 123) shall be performed and a determination of the proper group made based in similarity of the factors.
2. Radionuclides were assigned to groups that were protective of 10 microsieverts per year (1.0 millirem per year) and were limited to four groups for ease of application per Annex B of American National Standards Institute (ANSI) N13.12.
3. Rounded to one significant figure.
4. The screening levels shown are used for either surface activity concentration becquerels per square centimeter (Bq/cm²) or volume activity concentration in becquerels per gram (Bq/g) or picocuries per gram (pCi/g). These groupings were determined based on similarity of the scenario modeling results described in Annex B of ANSI N13.12
5. For decay chains, the screening levels represent the total activity (i.e., activity of the parent plus the activity of all progeny present).
6. Where the natural uranium activity equals 48.9% from U-238, 48.9% from U-234, and 2.25% from U-235.

This page intentionally left blank.



8.0 REFERENCES

- 29 CFR 1910, “Occupational Safety and Health Standards,” *Code of Federal Regulations*, Office of the Federal Register.
- 29 CFR 1926, “Safety and Health Regulations for Construction,” *Code of Federal Regulations*, Office of the Federal Register.
- ANSI/HPS N13.12 2013, *Surface and Volume Radioactivity Standards for Clearance*, 2013 Edition, American National Standards Institute, January 1, 2013.
- Engineer Manual (EM) 385-1-1 2014, *Safety and Health Requirements Manual*, U.S. Army Corps of Engineers, November 30, 2014.
- U.S. Environmental Protection Agency (EPA) 1991, “Guidance on Implementing the Radionuclide NESHAPs,” U.S. Environmental Protection Agency, Office of Radiation Programs, Washington, D.C., July 1991.
- NCRP 1996, *Screening Models for Releases of Radionuclides to the Atmosphere, Surface Water, and Ground*, NCRP Report No. 123, National Council on Radiation Protection and Measurements, Bethesda, Maryland.
- U.S. Army 2015. *The Army Radiation Safety Program*, Pamphlet DA PAM 385-24, U.S. Army, November 30, 2015.
- USACE 2021. *Record of Decision for Operable Unit (OU)-1 and OU-2, Former Harshaw Chemical Company Site, Cleveland, Ohio*. September 2021.
- USACE 2022. *Harshaw Chemical Company Scope of Work, Section C Technical Scope, Remediation of Operable Units 1 and 2*, U.S. Army Corps of Engineers, November 2022.

This page intentionally left blank.