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CP2-ER-0067/FR2C

Health and Safety Plan for the Paducah Plumes Operations and C-613 Sediment Basin Paducah, Kentucky

This document is approved for public release per review by:

JACKIE THOMPSON (Affiliate)

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CP2-ER-0067/FR2C

Health and Safety Plan for the Paducah Plumes Operations and C-613 Sediment Basin Paducah, Kentucky

Date Issued—November 2022

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract No. DE-EM0004895

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APPROVALS

Health and Safety Plan
for the Paducah Plumes Operations
and C-613 Sediment Basin
Paducah, Kentucky

CP2-ER-0067/FR2B

November 2022

Approved by:

BARRETT ADAIR (Affiliate) Digitally signed by BARRETT ADAIR (Affiliate) Date: 2022.11.15 13:44:38 -06'00'

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Bruce Ford Date
Environmental Services Director

DOE Approval Letter: N/A Date: _____

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Nuclear Safety Documentation: N/A per CP3-NS-2001 6.1.1.H

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REVISION LOG

REVISION NUMBER	DATE	DESCRIPTION OF CHANGES	PAGES AFFECTED
FR0	10/20/17	Initial Bluesheeting	All
FR1	12/7/17	Non-Intent Revision to Incorporate Bluesheeting Changes	All
FR1A	10/11/18	Non-Intent Revision to Correct Procedure Reference numbers Sequence, Procedure Numbers, and Titles	A-3 through A-5
FR2	6/18/19	Correct procedure reference numbers and titles, job description, added C-613 information, and total revision to the Emergency Management Section	All
FR2A	6/21/2022	Periodic Review has been completed with no changes identified in procedure technical content. Nonintent change to correct dates has been incorporated per CP3-NS-2001. Date for review cycle has been reset.	All
FR2B	6/15/22	Nonintent revision to correct procedure reference numbers sequence, procedure numbers, and titles. Remove appendix.	3, 9, 10, 12, 15, 16, 17, 21, 23, 24, 26, 27, 31, 34, 40, 44, 45
FR2C	10/23/2025	Periodic Review has been completed with no changes identified in procedure technical content. Nonintent changes have been incorporated per CP3-NS-2001. Date for review cycle has been reset.	All

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CRZ	contamination reduction zone
DOE	U.S. Department of Energy
D&R	Deactivation and Remediation
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
EQ	equalization
ES&H	environment, safety, and health
EW	extraction well
EZ	exclusion zone
FFA	Federal Facility Agreement
HASP	health and safety plan
HAZWOPER	hazardous waste operations and emergency response
ISMS	Integrated Safety Management System
JHA	job hazard analysis
KPDES	Kentucky Pollutant Discharge Elimination System
NEPCS	Northeast Plume Containment System
NPL	National Priorities List
NWPGS	Northwest Plume Groundwater System
O&M	operations and maintenance
OEL	occupational exposure limit
OSHA	U.S. Occupational Safety and Health Administration
PGDP	Paducah Gaseous Diffusion Plant
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
PPO	Paducah Plumes Operation
PSS	Plant Shift Superintendent
QA	quality assurance
RADCON	radiological control
RCRA	Resource Conservation and Recovery Act
RWP	radiological work permit
TLV	threshold limit value
TSS	total suspended solids
TU	treatment unit
USEC	United States Enrichment Corporation

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1. INTRODUCTION

1.1 PURPOSE

The purpose of this facility-specific Health and Safety Plan (HASP) for the Deactivation and Remediation (D&R) Contractor Paducah Plumes Operation (PPO) and C-613 Sediment Basin is to identify the potential hazards associated with the activities that support the U.S. Department of Energy (DOE), as well as to outline proper control methods to protect the workers, the public, and the environment from potential harm in accordance with CP2-SM-1000, *Activity Level Work Planning and Control Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. The PPO will include necessary operations and maintenance (O&M) to ensure that the Northwest Plume Groundwater System (NWPGS), the Northeast Plume Containment System (NEPCS), and the Northwest Storm Water Control Facility are operational and adequately maintained.

The PPO and C-613 Sediment Basin tasks will be performed in accordance with the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation 29 *CFR* § 1926.65, as applicable. The PPO and C-613 Sediment Basin HASP has been developed to meet the requirements of CP3-EP-1028, *Incident Command System.* The HASP also is to be used in conjunction with CP2-HS-2000, *Worker Safety and Health Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*; CP2-RP-0001, *Four Rivers Nuclear Partnership, LLC, Radiation Protection Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*; CP2-HS-1000, *Integrated Safety Management System Description for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*; and any applicable D&R Contractor procedures.

1.2 INTEGRATED SAFETY MANAGEMENT/ENVIRONMENTAL MANAGEMENT

The D&R Contractor is committed to implementing an Integrated Safety Management System (ISMS) and an Environmental Management System (EMS) that integrate personnel and environmental safety into management and work practices at all levels so that missions are accomplished while protecting the public, the workers, and the environment. The concepts of ISMS/EMS will be utilized to provide a formal, organized process to ensure the safe performance of work. The ISMS/EMS plans (CP2-HS-1000 and CP2-ES-0101, respectively) identify the methodologies that will be used to address previously recognized hazards and how the hazards are mitigated using the D&R Contractor's accepted environment, safety, and health (ES&H) practices.

The core functions and guiding principles of ISMS/EMS will be implemented by incorporating applicable programs, policies, technical specifications, and procedures from the DOE, U.S. Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), the D&R Contractor, and other applicable regulatory guidance. Brief descriptions of the five ISMS/EMS core functions are provided below.

1.2.1 Define Scope of Work

Defining and understanding the scope of work is the first critical step in successfully performing any specific activity in a safe manner. Each member of the project team will participate in discussions conducted to understand the scope and contribute to the planning of the work. The project team will meet with assigned project personnel to ensure that everyone understands the scope of work and the technical and safety issues involved. These meetings are conducted to ensure all parties are in agreement on the scope and approach to complete the work.

1.2.2 Analyze Hazards

In the course of planning the work, the project team will identify hazards, including personnel safety and environmental risks associated with the performance of the work. Hazards may be identified and assessed by performing a site visit, reviewing lessons learned, and reviewing project plans or historical data. The hazard assessment process is described in CP3-HS-2004, *Job Hazard Analysis.*

Once the hazards have been identified and assessed, measures will be identified to minimize risks to workers, the public, and the environment. These measures are described in the project-specific activity hazard analyses (JHAs), which serve to provide a control mechanism for all work activities. JHAs are detailed, activity-specific evaluations that address the hazards associated with the tasks and/or activities that will be performed. The JHA development process is a detailed evaluation of each task to identify specific activities or operations required to successfully complete the scope of work and define the potential chemical, physical, radiological, and/or biological hazards that may be encountered; the media and manner in which they may occur; and how they are to be recognized, mitigated, and controlled. Appropriate hazard controls may include engineering controls, administrative controls, and the use of personal protective equipment (PPE).The project team is responsible for the preparation, revision, and implementation of JHAs.

Applicable JHAs will be reviewed with assigned personnel who will perform the work. Participants in this review will sign and date the JHA to signify that they understand all hazards, controls, and requirements in the JHAs. Copies of the JHAs with appropriate signatures shall be maintained at the work site.

1.2.3 Develop/Implement Controls

Project-specific plans and technical procedures are the primary mechanisms used to flow down ISMS/EMS controls to the project team. Other mechanisms include program/project management systems, employee training, communication, work site inspections, independent assessments, and audits. These mechanisms are communicated in the following:

- Pre-job meetings;
- Orientations;
- Training;
- Plan-of-the-day/pre-job briefings;
- JHAs; and
- Radiological work permits (RWPs).

The plan-of-the-day/pre-job briefing incorporates the principles of ISMS/EMS. The specific steps within ISMS/EMS are emphasized to each employee. It is emphasized that no employee will be directed or forced to perform any task that he/she believes is unsafe, puts personal health at risk, or that could endanger the public or the environment. One of the key elements of ISMS/EMS is that all personnel have “stop work authority” and are encouraged to use this authority whenever they perceive the safety of workers, the public, or the environment to be at risk.

Employee involvement is emphasized in all training sessions, beginning with initial orientation training, and then is reinforced periodically in refresher training, as applicable, and in briefings/meetings. Employees are encouraged to participate in the selection, development, and presentation of training/meeting topics and their full and constructive input is encouraged in all communication sessions.

1.2.4 Perform Work

After the project team has been given approval to proceed, the project-specific plans will be implemented. The D&R Contractor's project team will verify that all applicable plans, forms, and records are contained in the project files and accessible by approved personnel. Actions that will be taken during the performance of the work to incorporate ISMS/EMS principles include the following:

- Plan-of-the-day/pre-job briefings;
- Monthly project safety meetings;
- Safety Specialist oversight/inspections;
- Safety inspections;
- Equipment inspection; and
- Stop work authority.

1.2.5 Feedback/Improvement

Feedback and improvement is accomplished through several channels, including ISMS/EMS audits, self-assessments, employee suggestions, lessons learned, and post-job briefings.

The D&R Contractor project management will encourage employees to freely submit suggestions that offer opportunities for improvement and constructive criticism on the program. Project management will conduct periodic inspections in accordance with CP3-OP-0500, *Performance/Process Observations and Tour Process*, and meetings with project personnel at the work site to discuss safety/environmental issues and/or concerns as well as other relevant topics.

During field activities, meetings and briefings will provide opportunities for project personnel to communicate the following:

- Lessons learned and any other topics relevant to the work performed,
- How work steps/procedures could be modified to promote a safer working environment,
- How communications could be improved within the project team, and
- Overall issues or concerns they may have regarding how the work was performed.

1.3 FLOWDOWN TO SUBCONTRACTORS

The D&R Contractor's approach to ES&H ensures that personnel, including subcontractors, are aware of their roles, responsibilities, and authorities for worker/public safety and protection of the environment. D&R Contractor subcontractors will be responsible for compliance with the D&R Contractor's Worker Safety and Health Program. In addition, the D&R Contractor subcontract requirements will flow down to lower-tier subcontractors. Subcontractor responsibilities are further identified in Appendix A, "Applicability and Responsibility Matrix," of CP2-HS-2000, *Worker Safety and Health Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. Personnel will have the appropriate health and safety training required by OSHA 29 *CFR* § 1926.65, Hazardous Waste Operations and Emergency Response, but also will undergo site-specific pre-job training including safety and environmental to ensure that ES&H issues related to the activities to be performed or specific to the work site are understood clearly. Documentation of training will be available for review prior to starting work.

1.4 SUSPENDING/STOPPING WORK

In accordance with CP2-HS-1000, employees and subcontractors have suspend/stop-work authority. This process is defined and governed by CP3-HS-2009, *Stop/Suspend Work*. Individuals involved in any aspect of the project have the authority and responsibility to suspend or stop work for any perceived threat to the safety and health of the workers, other personnel, or to the environment. Concerns shall be brought to the attention of the Environmental Remediation Manager, Pump-and-Treat Manager, and Safety Specialist; they will be evaluated by project management personnel, and actions will be taken to rectify or control the situation. In the case of imminent danger or emergency situations, personnel should halt activities immediately and instruct other affected workers to pull back from the hazardous area. The Environmental Remediation Manager, Pump-and-Treat Manager, and/or Safety Specialist should be notified immediately; at that time, D&R Contractor management and/or emergency responders will be notified.

1.5 HEALTH AND SAFETY BRIEFINGS AND ORIENTATIONS

Plan-of-the-day/pre-job briefings detailing the specific hazards of the work to be performed and safety precautions and procedures specific for the job shall be conducted by the Environmental Remediation Manager, Pump-and-Treat Manager, and Safety Specialist or designee at the beginning of each shift. During these briefings, work tasks and the associated hazards (personnel safety and environmental risks) and mitigating controls will be discussed using task-specific JHAs and/or Lessons Learned as guidance.

Prior to performing work on the site, personnel shall be required to read, or be briefed, on CP2-HS-2000, *Worker Safety and Health Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, this HASP, applicable JHAs, the work package, and other applicable work control documents. This shall be documented on acknowledgement forms, briefing sheets, as training or required reading. Visitors also will be oriented to the applicable plans and potential hazards that they may encounter as applicable.

1.6 DOCUMENT REVISION PROCESS

Any changes to this document shall be in accordance with CP3-OP-0002, *Developing and Maintaining Performance Documents*, and shall be reviewed by the Environmental Remediation Manager and safety staff to ensure that they are consistent with existing programmatic requirements. All changes to this HASP shall be approved by all signatories and the revision date noted. All affected personnel will be briefed on the changes prior to continuation of activities.

1.7 SITE BACKGROUND

The Paducah Gaseous Diffusion Plant (PGDP), located within the Jackson Purchase region of western Kentucky, is an inactive uranium enrichment facility owned by DOE. Most industrial activities are sited in an approximate 650 acre security area and buffer zone that are restricted from public access. The PGDP was owned and managed, first by the Atomic Energy Commission and the Energy Research and Development Administration, DOE's predecessors; DOE then managed the PGDP until 1993. On July 1, 1993, the United States Enrichment Corporation (USEC) assumed management and operation of the PGDP enrichment facilities under a lease agreement with DOE. USEC deleased the PGDP in October 2014. DOE retains ownership of the enrichment complex, is responsible for environmental restoration activities associated with the PGDP (CERCLIS# KY8-890-008-982), and serves as the lead agency for remedial actions at the PGDP. The EPA and the Kentucky Department for Environmental Protection serve as regulatory oversight agencies for the facility.

In July 1988, off-site groundwater contamination was detected in groundwater wells north of PGDP. In August 1988, the DOE and EPA Region 4 entered into an Administrative Consent Order under Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In May 1994, PGDP was placed on the National Priorities List (NPL), a list of sites designated by the EPA as having the highest priority for site remediation. Section 120 of the CERCLA requires NPL sites to enter into a Federal Facility Agreement (FFA). An FFA was finalized among the DOE, EPA, and the Commonwealth of Kentucky in February 1998.

1.8 PROJECT SITE DESCRIPTION

1.8.1 Northwest Plume Groundwater System Description

The NWPGS is a groundwater treatment facility located at PGDP near Paducah, Kentucky (Figure 1).The groundwater treatment system is housed in a pre-engineered metal building located outside the northwest corner of the PGDP security fence. The NWPGS is designed to recover and treat contaminated groundwater, to generate data to determine the treatment efficiency for the extracted groundwater, and to evaluate the effect of the extraction on the Regional Gravel Aquifer.

The primary objective of this interim remedial action is to initiate control of the highest trichloroethene (TCE) concentration portion [greater than 1,000 parts per billion (ppb)] of the Northwest Plume. The groundwater recovery system includes two wells in a south extraction well field at the PGDP security fence and two wells in a north extraction wells field at the north end of the 1,000 ppb TCE plume. The extracted groundwater is transferred through secondary containment dual-wall piping to the treatment facility. The treatment system is designed to remove TCE and technetium-99 (Tc-99) using air stripping and ion exchange technologies. The off-gas from the air stripper passes through granular activated carbon prior to discharge. The treated groundwater is discharged to a DOE permitted outfall.

1.8.2 Northeast Plume Containment System Description

The NEPCS (see Figure 2) is designed to recover groundwater contaminated by TCE from the Northeast Plume and deliver it to two treatment units (TUs), designated as C-765 and C-765-A, for air stripping. The optimized NEPCS consists of two new extraction wells (EWs) (EW234 and EW235), each of which is equipped with a submersible pump, drop pipe, and electrical service. After extraction, water is pumped through transfer lines to the TUs. Each of the EW transfer lines is configured such that each TU is dedicated to one of the EWs and is capable of being operated independently. The C-765 TU is operated to treat water extracted from EW234, and the C-765-A TU is operated to treat water extracted from EW235. Each unit consists of bag filters and an air stripper to support groundwater treatment. Bag filters remove suspended solids (if necessary) as a pretreatment to the air stripper, which is designed to remove TCE. The treatment system is contained within a weather-tight enclosure and includes a system control panel. The treated groundwater then is discharged to CERCLA Outfall 001, located downstream of Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 002.

Existing NEPCS components [EW331, EW332, equalization (EQ) tank, ancillary piping, system control panel, and power distribution panel] are located at an equipment pad designated as C-614. When operated, extracted groundwater from EW331 and EW332 is pumped through a transfer line to the EQ tank. A transfer pump moves the groundwater from the EQ tank through approximately 5,800 linear ft of underground transfer piping to the C-765 TU. Existing EWs, pipelines, and facilities not utilized as part of the optimized

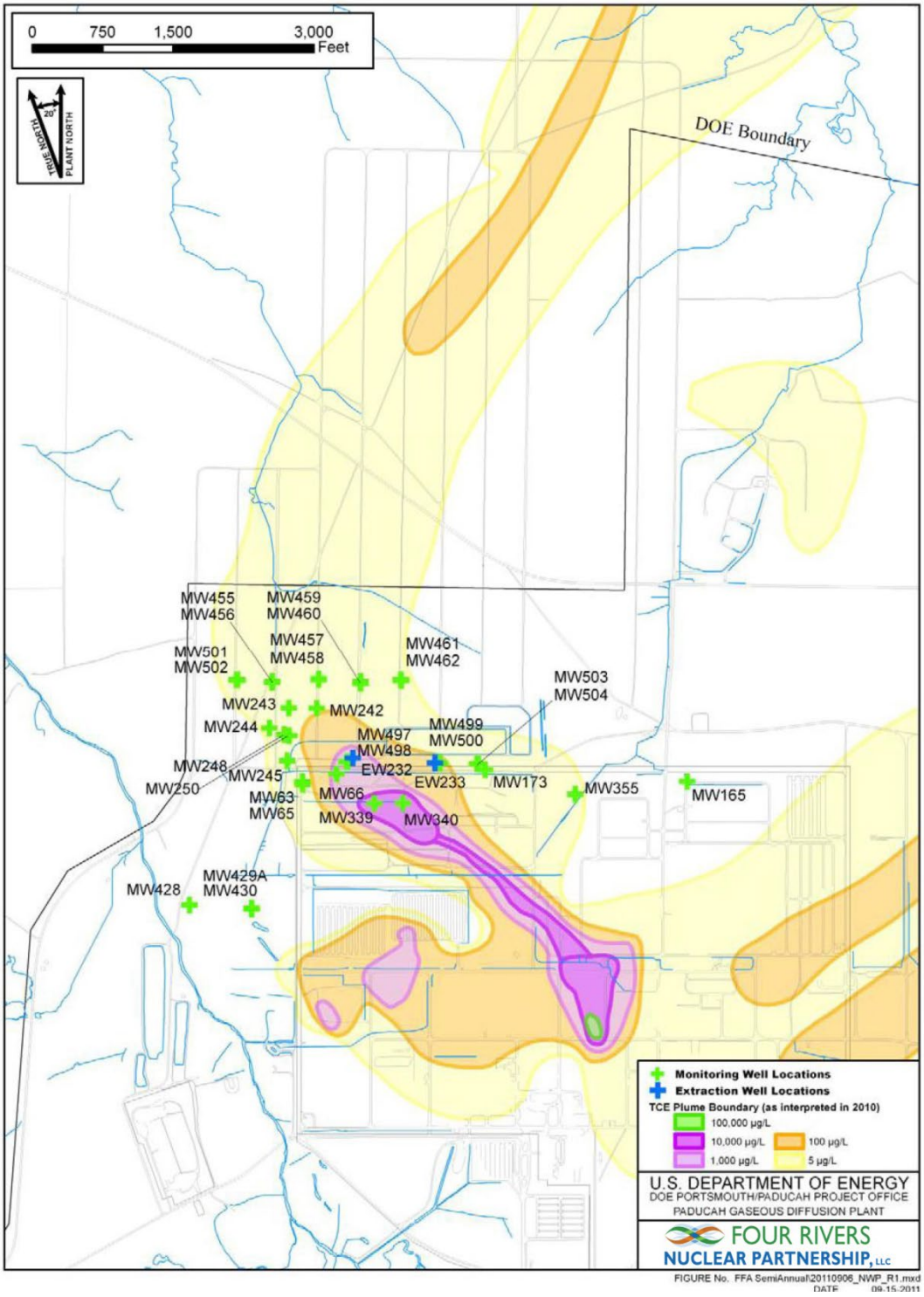

Figure 1. Northwest Plume Groundwater Wells

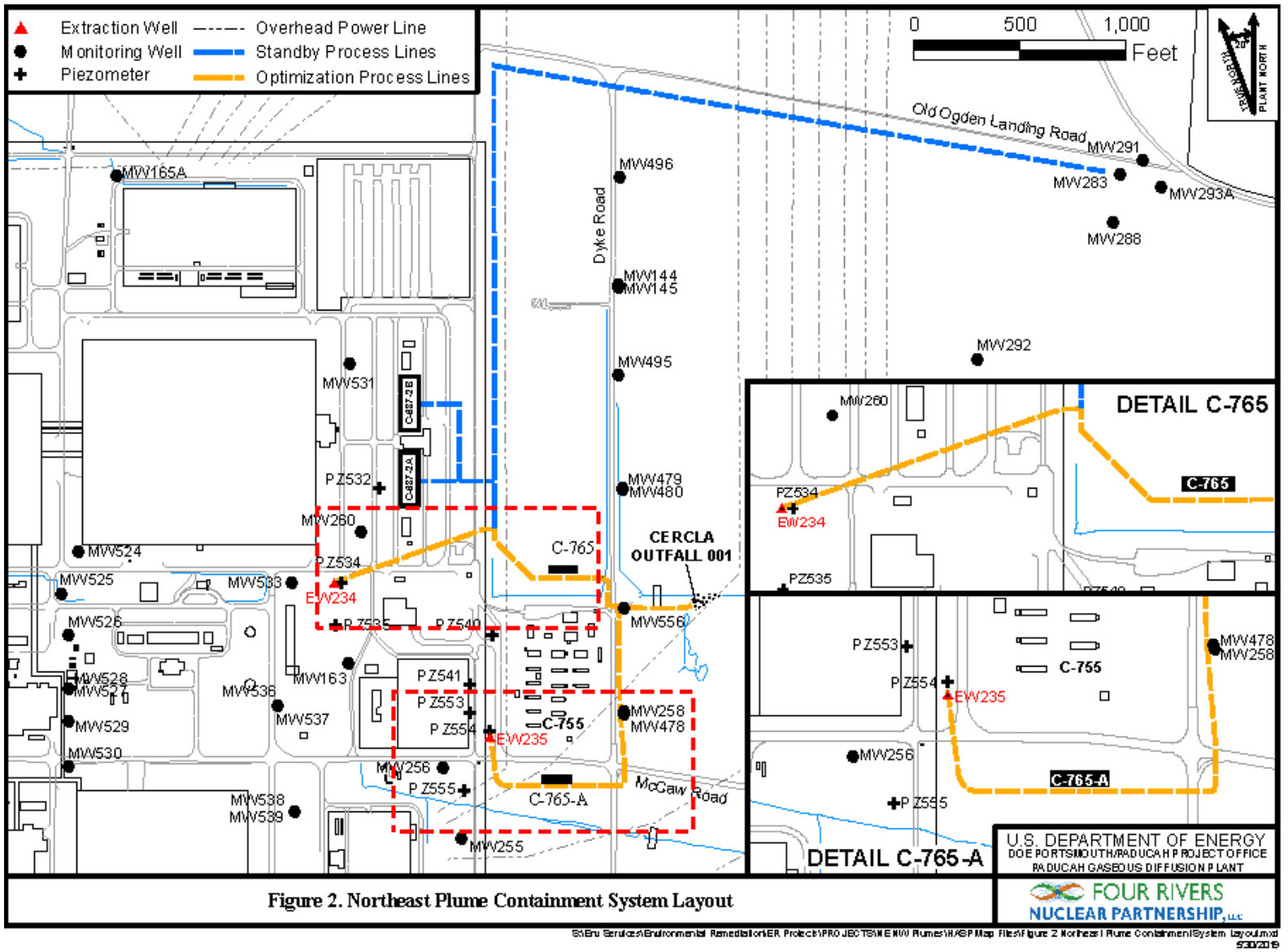

Figure 2. Northeast Plume Containment System Layout

the optimized NEPCS will be placed into a standby condition. EW331 and EW332 will be kept in good working condition until the FFA parties agree that maintenance no longer is necessary, and final disposition (including well abandonment) has been determined.

1.8.3 Northwest Storm Water Control Facility

The Northwest Storm Water Control Facility, also know at the C-613 Sediment Basin, shown in Figure 3, was installed to support the removal of scrap metal from the northwest corner of the fenced area of PGDP by limiting the migration of sediment from the removal site. The surface scrap metal has been removed from the site.

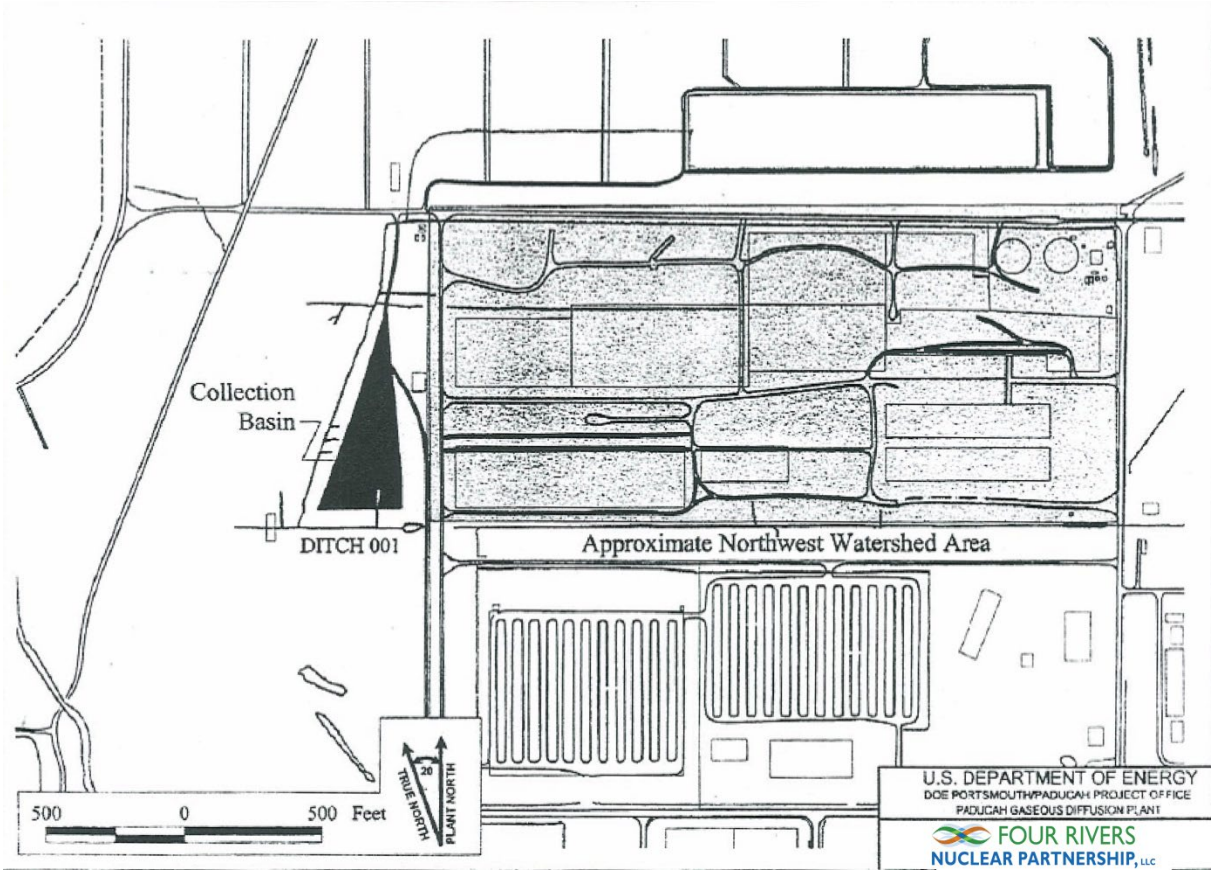

Figure 3. Northwest Storm Water Control Facility Layout

The C-613 facility consists of a sediment basin, which collects water and utilizes passive gravity-settling collection of runoff from the watershed area that contained the scrap metal area. The impounded water then can be tested to ensure the discharges to Ditch 001 will not cause effluent at KPDES Outfall 001 to exceed the limits for total suspended solids (TSS) or cause the pH to fall below 6 or to rise above 9 standard units. If the water is not within the targeted discharge range, the water then is treated through the application of polymers to induce flocculation and the introduction of acids and bases to adjust pH and TSS. If the water is within the targeted discharge range, it then is removed from the basin using transfer pumps and discharged to Ditch 001.

1.9 SCOPE OF WORK

The activities and goals associated with the PPO Project are described in these applicable O&M plans:

- DOE/OR/07-2044&D1/R5, *Operation and Maintenance Plan for the Northwest Storm Water Control Facility at the Paducah Gaseous Diffusion Plant Paducah, Kentucky*;
- DOE/LX/07-2469&D2, *Operation and Maintenance Plan for the Northwest Plume Groundwater System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*; and
- DOE/LX/07-2470&D1, *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

Work activities as referenced in the O&M plans are defined in the appropriate work packages, work instructions, and procedures in accordance with CP2-SM-1000, *Activity Level Work Planning and Control Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

Typical activities associated with the PPO are as follows:

- Samples and collects data to ensure proper operation of the systems;
- Monitors and maintains extraction wells and monitoring wells;
- Performs inspections, operation and maintenance on system components such as pumps, compressors, valves, gauges, etc.;
- Performs periodic media change out such as activated carbon or resin, as necessary; and
- Discharge of water within limits to designated outfall as required.

2. KEY PERSONNEL

One of the primary underlying principles of a successful project organization is the establishment of clearly defined roles and responsibilities and effective lines of communication among D&R Contractor employees and among D&R Contractor subcontractors, and other organizations. Ensuring that personnel fully understand their roles and responsibilities and that they have a thorough understanding of the scope of work and other project requirements will provide the foundation for successful and safe completion of the project. Individuals and responsibilities will be identified for the various project tasks in the applicable work packages/instructions and communicated to personnel prior to work.

The following section describes the roles and responsibilities of key personnel associated with the implementation of the HASP. Each team member shares the responsibility of accomplishing the scope of work; achieving required quality; participating in work planning and JHA development; and maintaining compliance with laws, regulations, and DOE Orders and Directives in a safe working environment. In general, it is the responsibility of every D&R Contractor employee and subcontractor to ensure that work performed is accomplished in a safe and professional manner.

2.1 ENVIRONMENTAL REMEDIATION MANAGER AND ENVIRONMENTAL STEWARDSHIP MANAGER

The Environmental Remediation Manager and Environmental Stewardship Manager have ultimate responsibility for providing safe and compliant facility operation coupled with accomplishing the scope of work on schedule and within established budget by performing the following tasks.

- Ensuring a safe work environment that promotes a Zero Accident Policy.
- Ensuring compliance with applicable procedures, laws, regulations, and DOE Orders and Directives, including, but not limited to, the following:
  - — OSHA, CERCLA, Superfund Amendments and Reauthorization Act (Title III), and Resource Conservation and Recovery Act (RCRA);
  - — 29 *CFR* § 1926, Safety and Health Regulations for Construction; 40 *CFR* § 260–270, *Hazardous Waste Regulations*; 40 *CFR* § 761*, Polychlorinated Biphenyls*; and
  - — DOE Policy 450.4, Safety Management System Policy; DOE O 450.1, *Environmental Protection Program;* DOE G 450.1-1A, *Implementation Guide for use with DOE O 450.1*; and DOE O 414.1C, *Quality Assurance*.
- Providing necessary resources to the project managers to ensure ISMS/EMS principles and functions are met.
- Managing, directing, and leading the workforce to accomplish the scope of work in a disciplined, timely, and cost effective manner.
- Ensuring that procedures, work plans, and work packages are prepared in accordance with the D&R Contractor work control process.
- Designating field teams and briefing line management and other key personnel on specific assignments.
- Coordinating with industrial safety and radiological control (RADCON) on issues pertinent to employee safety and health.
- Establishing clear project roles and responsibilities as well the communicating line management's responsibility for safety and health.
- Supporting DOE in liaison with public officials and securing access permission for visitors and officials.
- Ensuring completion of all quality documents and records as required by D&R Contractor plans and procedures.
- Fostering a wholesome and safe work environment that promotes a Zero Accident Policy.
- Assisting in the completion of work plans and packages.
- Ensuring work is planned in accordance with procedures and the principles of ISMS/EMS and that these are followed through the work process.

- Ensuring worker involvement in the work planning process and that safety concerns are resolved before work proceeds.
- Ensuring compliance with laws, regulations, and DOE Orders and Directives.
- Directing the workforce to accomplish the scope of work in a disciplined, timely, and cost-effective manner.
- Coordinating with Safety Specialist and RADCON on safety and health and radiological issues.
- Ensuring that hazards are analyzed appropriately and that JHAs are developed and maintained properly.
- Completing all quality documents and records as required by the D&R Contractor plans and procedures.
- Leading accident/incident investigations, as required.

2.2 FACILITY MANAGER

The Plumes Operations Facility Manager reports to the Environmental Remediation Manager and has the following responsibilities:

- Authorizing all activities within assigned facilities;
- Determining facility safety basis operability;
- Establishing and maintaining facility access control;
- Reviewing and approving all work control documents prior to authorization; and
- Maintaining radiological and chemical inventory control in accordance with the applicable nuclear safety basis document(s).

The C-613 Facility Manager reports to the Environmental Stewardship Manager through the Environmental Field Compliance Manager and has the following responsibilities:

- Authorizing all activities within assigned facilities;
- Determining facility safety basis operability;
- Establishing and maintaining facility access control;
- Reviewing and approving all work control documents prior to authorization; and
- Maintaining radiological and chemical inventory control in accordance with the applicable nuclear safety basis document(s).

2.3 PUMP-AND-TREAT MANAGER

The Pump-and-Treat Manager reports to the Environmental Remediation Manager and has the following responsibilities:

- Establishing and maintaining project area access control and authorizing activities within the controlled work areas;
- Assisting the project director with overall management of the project;
- Coordinating field efforts and support personnel to ensure that field operations are performed in compliance with regulations, DOE Orders, programs, and procedures;
- Completing all quality documents and records as required by the D&R Contractor plans and procedures;
- Ensuring that workers are suitable for work based on training and medical qualifications;
- Ensuring that the work team is supplied adequately with information, materials, and equipment;
- Ensuring daily briefings are conducted with the participation of field team members;
- Executing work plans while adhering to prescribed safety regulations and procedures;
- Participating in accident/incident investigation;
- Directing workers and ensuring field operations are performed in compliance with regulations, DOE Orders, programs, and procedures;
- Ensuring compliance with waste management standards and regulations;
- Implementing work plans, procedures, and leading hazard assessments and the implementation of hazard controls;
- Completing all quality documents and records as required by the D&R Contractor plans and procedures;
- Directing worker activities and verifying that workers are suitable for work based on training and medical qualifications;
- Ensuring that the work team adequately uses the information, materials, and equipment;
- Performing daily briefings with the participation of field team members;
- Executing work plans while adhering to prescribed safety regulations and procedures; and
- Participating in accident/incident investigation.

2.4 SAFETY SPECIALIST

The Safety Specialist is responsible for the following:

- Establishing standards and providing oversight to safety and health compliance, training, and safety and health performance;
- Providing independent oversight for Safety and Health;
- Assisting the Pump-and-Treat Manager, the Environmental Remediation Manager and the Environmental Stewardship Manager with verification of employee suitability for work based on the employee's training and physician's recommendation;
- Advising personnel of potential exposures and consequences;
- Assisting in hazard analysis and ensuring that JHAs are developed and maintained properly;
- Conducting inspections, as necessary, to verify proper implementation of the Worker Safety and Health Program;
- Notifying the Plant Shift Superintendent (PSS) Environmental Remediation Manager and the Environmental Stewardship Manager as required in the Worker Safety and Health Program and this HASP;
- Completing all safety and health documents and records as required by the D&R Contractor plans and procedures; and
- Participating in accident/incident investigations.

2.5 QUALITY ASSURANCE SPECIALIST

The Quality Assurance (QA) Specialists may be responsible for certain aspects of program implementation and/or assisting project and functional management in the implementation of the QA Program requirements within his/her area of responsibility. Other activities include, but are not limited to, the following:

- Reviewing and approving plans and procedures, as required, for QA requirements;
- Reviewing procurement, engineering, and/or design documents affecting item or service requirements;
- Performing and documenting scheduled QA independent assessments and/or surveillances to evaluate the adequacy of project, functional, and subcontractor organizations implementation of QA Program Plan requirements;
- Participating in readiness/operational reviews of projects and activities;
- Tracking and trending identified issues and corrective actions in issues management database;
- Identifying problems to management that hinder organizational effectiveness or contract performance;
- Reviewing nonconformance documentation and submitting the documentation for nonconforming or suspect/counterfeit items for entry into the DOE nonconformance tracking system database;
- Providing support as required for reportable occurrences, as requested by the organizations responsible for the events;

- Assisting line organizations in problem identification, causal analysis, and Lessons Learned development;

- Implementing procedure governing the identification, evaluation (screening), and reporting of potential Price-Anderson Amendments Act noncompliance; and

- Assisting in the development and revision of issues management reports for nonconforming items.

2.6 RADIOLOGICAL CONTROL TECHNICIAN

RADCON works with management and the field team to accomplish the following.

- Providing support and oversight for field activities to ensure compliance with the RWP and applicable procedures.

- Performing radiological surveys, field support, and dosimetry work, as specified in the RWPs.

- Assisting in the hazard review process and PPE selection and recommendation.

- Performing responsibilities as the decontamination station officer to ensure that appropriate decontamination of all personnel, equipment and samples are completed, as well as assisting in the disposal of contaminated clothing and material.

- Participating in accident/incident investigations, as necessary.

2.7 PROJECT HEALTH PHYSICIST

The Project Health Physicist works with management and the field team to accomplish the following:

- Evaluating radiological hazards,
- Analyzing data, and
- Writing as low as reasonably achievable reviews and RWPs.

2.8 CRAFT PERSONNEL

Craft personnel—(e.g., operators, maintenance mechanics)—report to a frontline supervisor in Environmental Services. Craft personnel have the following responsibilities:

- Performing work as specified in work packages and as directed by the Pump-and-Treat Manager;

- Participating in the preparation of the project Worker Safety and Health Program and project JHAs;

- Adhering to all requirements of the Worker Safety and Health Program, HASP, RWPs, project plans, procedures, and JHAs;

- Participating in the identification of the hazards and development of the work controls to be utilized during the work;

- Stopping or suspending work as needed and accident/incident reporting;
- Assuring they are properly trained to perform assigned responsibilities;
- Participating in pre-job and post-job briefings; and
- Participating in accident/incident investigations, as necessary.

2.9 ENVIRONMENTAL FIELD COMPLIANCE MANAGER

The Environmental Field Compliance Manager has the following responsibilities:

- Providing technical guidance to the project team on environmental compliance issues;
- Interpreting data pertinent to environmental compliance and serving as an advisor to the project team; and
- Participating in accident/incident investigation, as necessary.

2.10 WASTE MANAGEMENT DIRECTOR

The Waste Management Director oversees the following:

- Assisting in the development of work packages for compliance with the D&R Contractor Work Control Program;
- Providing support for field activities to ensure waste is properly characterized, stored, transported and treated/recycled/disposed of in accordance with applicable regulations and procedures;
- Directing the management of radioactive, RCRA, and Toxic Substances Control Act waste operations;
- Ensuring compliance with waste management standards and regulations; and
- Completing quality documents and records as required by the D&R Contractor plans and procedures.

2.11 SUBCONTRACTORS

Specialty subcontractors and maintenance/construction subcontractors will provide equipment and expertise during the design, construction, commissioning, and operation. Each has the following responsibilities:

- Providing input into designs, plans, procedures and work control documents;
- Performing work as specified in plans, procedures and work packages as directed by the front line manager;
- Adhering to all requirements of the Worker Safety and Health Program, HASP, RWPs, subcontract requirements, project plans, procedures and JHAs;

- Assuring proper training to perform assigned responsibilities;
- Participating in the identification of the hazards and development of the work controls to be utilized during the work; and
- Participating in accident/incident investigation, as necessary.

3. HAZARD ANALYSIS

This section outlines the potential general, chemical, radiological, and physical hazards to which workers may be exposed during field activities. The assessment of chemical and physical hazards in this section is based on the information provided from project documents. The soil removal and associated tasks may have the potential to expose workers to certain contaminants. The following section summarizes those hazards. Specific hazards and controls will be identified in the task-specific JHAs.

3.1 GENERAL SITE HAZARDS

3.1.1 Operation of Project Vehicles

All field personnel operating vehicles shall have a valid operator's license for the type of vehicle being operated, drive responsibly, and comply with posted speed limits. All vehicle occupants shall use seat belts while project vehicles are in operation and drivers also shall comply with project-specific training requirements. The use of cellular phones or other potentially distracting activities while driving on company business is prohibited. Operators should walk around the vehicle and check for obstacles and material prior to backing up.

Large vehicles and heavy equipment, such as excavators, cranes, and forklifts, have blind spots and the potential for pinch and crush hazards. Heavy equipment shall have a functioning backup alarm or a spotter will be required when the vehicle is backing up in congested areas. The spotter shall not stand directly behind the equipment while the equipment is backing.

Equipment operations will be in accordance with CP3-SM-0020, *Administrative Controls for Powered Industrial Trucks*, and CP3-HS-2039, *Spotter Safety.*

3.1.2 Tools and Equipment

Tools and equipment shall be inspected visually prior to each use to ensure that the devices are in good working order. All guards and safety devices (e.g., power tools) shall be in place when the equipment is in use. The individual conducting an inspection should look for signs of wearing (e.g., frayed power cords, loose parts), missing components (e.g., lock pins, guards), and any indication of a potentially unsafe condition. Deficiencies affecting safe operation of project equipment shall cause the equipment to be taken out of service until properly repaired. D&R Contractor field equipment and tools shall only be operated by knowledgeable personnel with appropriate work experience and awareness of the hazards and safe operating procedures of the devices. This determination is to be made by the Safety Specialist or his/her designee.

3.1.3 Material and Drum Handling

Material handling will be accomplished using safe lifting procedures. Mechanical lifts and/or carts will be used whenever possible. Whenever moving or lifting objects, travel paths and actions should be considered prior to initiating the work. Drum handling activities include the general handling, transport, and opening and closing of drums along with the storage of wastes within the drums. These activities shall be performed in accordance with CP3-WM-1017, *Safe Handling and Opening of Sealed Containers*, and only by individuals who are knowledgeable in the use of appropriate techniques, drum-handling equipment, and safety devices. Drums/containers will be handled as to avoid spills or releases, such as using spotters when using forklifts to pick-up or move containers and place containers with liquids in/on secondary containment when not in transit.

Drums containing wastes or material could become pressurized and must be inspected prior to handling or opening in accordance with CP3-WM-1017, *Safe Handling and Opening of Sealed Containers*. If the container/drum appears to have a swollen lid, side, or bottom and/or emits a hissing sound, consider the container to be pressurized. Do not touch, move, or disturb the container and report it to the Environmental Remediation Manager or the Environmental Stewardship Manager, as appropriate, and Safety Specialist immediately for appropriate actions. Empty drums also must be inspected prior to opening, since they may be pressurized if subjected to changing temperatures.

3.1.4 Electrical Service

D&R Contractor personnel using portable generators shall ensure that the units are grounded, as required, prior to use. To provide additional worker protection, ground-fault circuit interrupters will be used at the primary power distribution location whenever portable electrical equipment powered by 120-volt alternating current is used. Whenever possible, electrical cords will be routed out of traffic areas or adequately shielded. As with other field equipment, all cords should be inspected before use, and any damaged equipment shall be removed from service until replaced or repaired. Personnel will adhere to requirements set forth by National Fire Protection Association 70E and CP3-SM-0019, *Electrical Safety Guidelines*.

3.1.5 Fire Safety

Refueling of equipment can present a significant fire/explosion hazard if subjected to sparks, static electricity, or other ignition sources. Containers transferring flammable liquids to another container shall be bonded appropriately prior to use. Only safety containers approved by the Factory Mutual Research, Underwriters Laboratories, or the U.S. Department of Transportation will be used to transport and store these liquids. Personnel are to ensure that the equipment used to transfer the liquids is approved for the material being handled and personnel should take precautions to prevent overfilling and spill/drips. Safety cans shall be labeled as to their contents and properly secured during transport. When applicable, equipment should be given adequate time to cool down before refueling. During refueling operations a 20-BC rated fire extinguisher will be within 50 ft of the operation.

Smoking is not allowed in the work area or radiologically controlled areas. Smoking will be allowed in designated areas and cigarette butts properly discarded as not to create litter or pose a fire risk.

3.1.6 Housekeeping

Good housekeeping, including routine site cleanup and waste management, shall be practiced at all times to improve the general safety of the site activities. Housekeeping efforts may include eliminating or minimizing slip, trip, and fall hazards. Sanitary trash shall be containerized and disposed of periodically.

Supplies, materials, and ancillary equipment should be properly stored when not in use in and away from walk areas.

3.1.7 Slips, Trips, and Falls

The work locations, especially excavations, elevations, rough terrain, as well as steps, ladder and obstructions, may pose hazards causing slips, trips, and/or falls. Care should be taken when accessing work locations, working around uneven terrain, and obstructions should be kept out of walkways, and slipping hazards, such as grease, oil, water, or other liquids, shall be cleaned up or eliminated in work areas, ladders and walkways.

3.1.8 Inclement Weather

All field activities shall be paused during thunderstorms or high wind conditions. Personnel will secure equipment and materials in a safe condition and move to the designated assembly point. Building evacuation assembly points are presented in Section 11 and will be covered with all personnel as part of the initial site-specific briefing and reviewed, as necessary, during plan-of-the-day/pre-job briefings.

Local assembly points and evacuation routes are not identified for unoccupied facilities, including C-613, C-765, C-765-A, and the extraction wells. When working in these areas, shelter should be taken in the nearest permanent building structure or storm shelter.

3.1.9 Head, Eye, Hand, and Foot Hazards

Work activities have potential hazards that may result in injuries to the head, eyes, hands, or feet. The use of engineering controls (such as ensuring that appropriate machine guarding is in place) or administrative controls (such as restricting personnel from encroaching in machine operating areas) has limited applications for these hazards. The use of PPE will be necessary to adequately address these hazards. Where these hazards exist, the task-specific JHA will specify the use of appropriate PPE, including hard hats, safety eye protection, and/or safety-toed footwear.

3.2 SUSPECTED CHEMICAL AND RADIOLOGICAL HAZARDS

TCE. TCE is the primary contaminant detected in groundwater associated with the NWPGS and the NEPCS. TCE is a halogenated organic compound used by industry in the past for a variety of purposes .It mainly was used as a degreasing agent at PGDP. The EPA has set the maximum contaminant level for drinking water at 5 ppb and the American Conference of Governmental Industrial Hygienists (ACGIH) has the 8-hour time weighted average at 10 ppm. TCE is a nonflammable, oily, colorless liquid that has a sweet odor and a sweet, burning taste. Historically, TCE was used as a solvent to clean equipment. It is heavier than water and has low solubility (up to one part TCE per thousand parts of water at room temperature).TCE in high concentrations may take on a liquid form commonly referred to as dense nonaqueous-phase liquid and in the presence of water forms a separate phase from the water. These qualities make TCE a difficult contaminant and, when present in groundwater, TCE tends to settle into a layer at the bottom of the aquifer and then continuously dissolve into the groundwater. This has resulted in varying levels of TCE in the aquifer for years after the release of TCE at PGDP. TCE is not currently used at PGDP.

Breathing small amounts of TCE may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating. Breathing large amounts of TCE may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage. Drinking large amounts of TCE may cause nausea, liver damage, unconsciousness, impaired heart function,

or death. Drinking small amounts of TCE for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear. Skin contact with TCE for short periods may cause skin rashes. In its 11th Report on Carcinogens, the National Toxicology Program determined that TCE is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer has determined that trichloroethylene is a "probable (Group 2A) human carcinogen."

Potential radiological hazards associated with work at PGDP come from a few radionuclides including uranium-234, -235, -238 and Tc-99. Primarily exposure to Tc-99 is associated with the groundwater contamination.

Uranium-234, -235 and -238. Uranium-234, -235 and -238 (collectively) may be the most abundant radionuclides at PGDP, and together they pose a potential for worker exposure when performing invasive work and in radioactive control areas. Uranium isotopes undergo radioactive decay by emission of an alpha particle and weak gamma radiation. Workers may be exposed to uranium by inhaling contaminated dust in the air, ingesting contaminated water and food, or if not properly protected through cuts in the skin. Uranium may be harmful to people as a chemical toxin, as well as radioactive substance, and once inside the body is linked to cancer and especially kidney damage.

Tc-99. Tc-99 is a fission product and is a long-lived, low-energy beta-emitting radionuclide and is one of the major contaminants of concerns, especially in the groundwater plume. Tc-99 is a light element that is very mobile and bonds to protein and usually cannot be easily removed, especially from hair. Like most radionuclides, it is harmful if taken internally although the beta particles it emits are very weak; it does not cause as much dose as that from a similar quantity of transuranics.

There is a potential of exposure to other materials as part of site operations. These material descriptions and permissible exposure limits (OELs) are listed in Table 1.

The potential for personnel exposure is limited and controls are implemented through the procedures, work instructions, RWPs and JHAs.

Table 1. Chemical Exposure and Hazard Information

Substance	Odor	OEL	Route	Symptoms of Exposure	Treatment
Carbon monoxide	Odorless	25 ppm	Inhalation	Headache; nausea, weakness; dizziness; confusion; hallucinations; angina; coma; death	Eye: Immediate medical attention Skin: Immediate medical attention Breath: Respiratory support
Trichloroethene (TCE)	Characteristic aromatic	10 ppm	Inhalation Ingestion Contact	Eye, skin and mucous membrane irritation; dermatitis; headache, fatigue, dizziness, confusion	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention

Table 1. Chemical Exposure and Hazard Information (Continued)

Substance	Odor	OEL	Route	Symptoms of Exposure	Treatment
Uranium	Dust visible	0.2 mg/m^3	Inhalation Ingestion Contact	Irritated eyes, nose and throat, dermatitis; skin burns; nausea; jaundice;	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
Uranium Isotopes	N/A	Set by 10 *CFR* 835	Inhalation Ingestion Contact	Kidney toxicity, Cancer	If suspected contact, notify RADCON immediately
Technetium-99	N/A	Set by 10 *CFR* 835	Inhalation Ingestion	Cancer	If suspected contact, notify RADCON immediately
Compressed Argon (simple asphyxiant)	Gas	N/A	Inhalation Contact	Headache; nausea, weakness; dizziness; confusion; difficulty breathing	Breath: Respiratory support, oxygen, immediate medical attention
Diesel fuel	Oily	100 mg/m^3	Inhalation Ingestion Contact	burning sensation in chest; headache, nausea, weakness, restlessness; incoherence, confusion, drowsiness; diarrhea; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention
Diesel exhaust (Carcinogenic)	Varies upon exhaust components	CO 25 ppm	Inhalation	Eye irritation; pulmonary function changes	Breath: Respiratory support
Gasoline (Carcinogenic, benzene)	Characteristic aromatic	300 ppm	Inhalation Ingestion Contact	Eye, skin, and mucous membrane irritation; dermatitis; headache, fatigue, dizziness, confusion	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention
Polychlorinated Biphenyls (in soil or stains)	Dust visible Oily stains	0.5 mg/m^3	Inhalation Ingestion Contact	Irritated eyes, nose and throat, dermatitis.	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support
Sodium Carbonate (Soda Ash) (dust)	Odorless, White dry powder	15 mg/m^3 (total) 5 mg/m^3 (resp)	Inhalation Ingestion Contact	Irritated eyes, nose and throat, slight skin irritation; dermatitis.	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Fresh air, respiratory support Swallow: Medical attention immediately
Hydrochloric Acid Sulfuric Acid Nitric acid	Vapors	5 ppm 0.2 mg/m^3 2 ppm	Inhalation Ingestion Contact	Irritated eyes, nose and throat, larynx; cough, choking; dermatitis; skin burns; pulmonary edema	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention

Table 1. Chemical Exposure and Hazard Information (Continued)

Substance	Odor	OEL	Route	Symptoms of Exposure	Treatment
Methanol	Sweet	200 ppm	Inhalation Ingestion Contact	Eye, skin and mucous membrane irritation; headache, fatigue, dizziness, confusion	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention
Aluminum Sulfate	NA	1.0 mg/m3	Inhalation Ingestion Contact	Irritation to eyes, skin, respiratory tract, and other mucous membranes. Irritation may cause adverse effects.	Eye: Irrigate immediately Skin: Remove contaminated clothing and drench skin with water. Ingestion: Rinse mouth. Do not induce vomiting. Inhalation: Move to open air. Obtain medical attention for all exposures.
Citric Acid Anhydrous	Odorless	2.0 mg/m3	Inhalation Ingestion Contact	Irritation to eyes and respiratory tract. Mild irritation to skin	Eye: Irrigate immediately Skin: Remove contaminated clothing and wash with soap and water. Ingestion: Rinse mouth with water and afterwards drink plenty of water. Inhalation: Move to open air.

3.3 SUSPECTED BIOLOGICAL HAZARDS

Biological hazards that may be present at the site include snakes; insects; ticks; and poisonous plants, such as poison ivy, oak, or sumac. Personnel should be aware of the presence of potential hazards and prevent insects and ticks with repellant and avoid hazards as much as possible. Personnel who are, or may be, hypersensitive to plants and insects stings should report their condition to the Environmental Remediation Manager and Safety Specialist.

Ticks are a particular concern when working in the wooded and grassy area around the plant. The D&R Contractor is committed to protecting personnel from the potential exposure of Lyme disease; therefore, controls have been implemented in the task specific JHA when working in areas where ticks pose an obvious risk such as the wooded areas. Project personnel should make every effort to have the feasible areas mowed prior to personnel entering the area to work.

3.4 SUSPECTED PHYSICAL/CONSTRUCTION HAZARDS

The physical hazards discussed in the sections that follow have been identified as potential hazards for activities and/or tasks that will be required during the work activities. Strict adherence to standard work practices and D&R Contractor procedures will aid in the elimination or control of these hazards.

3.4.1 Noise

Saws, generators, and other equipment may produce noise exceeding 85 decibels. Sound levels will be assessed and/or measurements will be taken for specific equipment and tasks, and project personnel will be made aware of the hearing protection requirements. Noise prevention and protection will be in accordance with CP2-HS-2002, *Occupational Noise Exposure and Hearing Conservation Program*.

3.4.2 Pinch/Compression Points

Pinch and compression points associated with excavation, drilling, sampling, and other equipment may result in injury to personnel. All equipment must be maintained in proper working order, with all protective shields or guards in place. Any equipment found to be lacking in these areas will be removed from service in accordance with CP3-HS-2008, *Accident Prevention/Equipment Control Tags*. Any activity with the potential for pinch/compression point hazards will be identified in a task-specific JHA and controls will be identified to mitigate those hazards.

3.4.3 Traffic and Heavy Equipment

The primary work locations typically are located off the main road and are not affected by heavier plant traffic, but, from time to time, personnel may encounter areas that are more heavily traveled by plant traffic and cylinder haulers. These conditions pose hazards to personnel and must be respected; personnel must remember that cylinder haulers have the right-of-way on plant roads. Personnel working in the area of traffic and/or heavy equipment shall wear a high visibility shirt, vest or jacket. Also, personnel walking on plant site shall walk only on designated walkways when walkways are available.

3.4.4 Steam and High-Pressure Cleaning Equipment

Decontamination of equipment may require the use of steam and high-pressure cleaning equipment. Project personnel performing decontamination activities will do so in accordance with the task-specific JHA. Personnel will be knowledgeable of the use and hazards associated with the cleaning equipment and utilize appropriate PPE. Personnel using this equipment will, at a minimum, wear the following PPE: safety glasses, face shield, hard hat, steel-toed boots, and disposable latex or nitrile gloves. Additional PPE may be required for radiological protection. Any proposed variation from the prescribed PPE requirements must be approved by the Safety Specialist and Environmental Remediation Manager before implementing the change. Personnel should be aware that PPE and decontamination solutions may present an environmental hazard and should be managed in a manner to prevent mixing with other wastes/materials.

3.4.5 Repetitive Motion

Activities involving potential hazards associated with repetitive motion will be addressed in task-specific JHAs. Awareness and controls, such as taking frequent breaks, utilizing worker rotation, and position modification, will be covered with affected personnel during pre-job and daily meetings as needed.

3.5 ENVIRONMENTAL MANAGEMENT SYSTEM HAZARDS

The EMS hazards discussed in the sections that follow have been identified as potential impact for activities and/or tasks that will be required during the work activities. Strict adherence to standard work practices and D&R Contractor procedures will aid in the elimination or control of these hazards.

3.5.1 Waste Generation/Waste Minimization

Personnel will minimize the wastes generated during work activities. They will segregate, store, manage, and recycle/dispose of wastes properly, as provided in CP2-ES-0005, *Pollution Prevention/Waste Minimization Plan for the Deactivation and Remediation Project, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

3.5.2 Spills/Releases to the Environment

Personnel will use caution when handling samples, duplicates, preservatives, and other hazardous materials/contaminants to prevent spills/releases to the environment and provide timely response if a spill/release should occur. Spill response is addressed in Chapter 11 of this HASP and containment is addressed in Chapter 13.

4. TRAINING

All Paducah Site DOE employees, contractor employees, and subcontractors are required (prior to entry) to take the general employee training and initial security briefing in order to have continuous Paducah Site entry. Consolidated annual training and the Portsmouth/Paducah Project Office Annual Security Refresher Briefing are required annually to maintain access to the Paducah Site. These core training requirements, plus all specific training requirements for Paducah Plumes workers and C-613 Sedimentation Basin workers, are documented and tracked in the D&R Contractor's Local Education Administrative Requirements Network database.

Workers entering the exclusion zone (EZ) or contamination reduction zone (CRZ) will be required to take appropriate HAZWOPER training associated with the tasks and ongoing activities. This training must cover the requirements in 29 *CFR* § 1926.65, HAZWOPER. In addition, workers must receive annual 8-hour refresher training (if applicable) and 3-day on-site supervision under a trained, experienced supervisor. Supervisory personnel shall receive additional 8-hour training in hazardous waste operations supervision. Workers and visitors entering the EZ or CRZ will be briefed in the provisions of this HASP. Workers entering radiological posted work areas also will be required to complete Radiological Worker Training in accordance with CP3-RP-1104, *Radiological Area Entry Control*.

5. PERSONAL PROTECTIVE EQUIPMENT

The use of appropriate PPE is required for personnel involved in operations where exposure to hazardous conditions exist and cannot be eliminated by engineering controls or where such equipment is needed to reduce hazards. These areas include C-612, C-614, C-765, C-765-A, extraction wells, and C-612. PPE will be selected and used in accordance with OSHA standards and the requirements of D&R Contractor procedures. PPE selection will be determined by industrial safety and RADCON to ensure protection of the workers from site-specific hazards posed by the task and work location.

PPE will be utilized as follows:

- It is not possible and/or feasible to implement engineering controls and work practices that will unequivocally ensure the safety and health of workers.

- It is necessary to reduce and maintain employee exposure less than the applicable OELs in 29 *CFR* § 1910, Subparts G and Z, and/or less than the applicable threshold limit values (TLVs) established by the ACGIH, or in the absence of OELs or TLVs, less than the applicable recommended exposure limits published by the National Institute for Occupational Safety and Health.

- Radiological materials/contamination may be present in excess of levels established by site RADCON criteria.

- Workers may be exposed to chemical contamination through skin absorption.

Existing or potential physical hazards may pose a threat to worker safety and health. Because potential hazards will vary with individual field activities, PPE may be modified for specific tasks. The PPE for each task will be listed on applicable JHAs and RWPs.

Initial entry to work areas will include PPE appropriate for the predicted hazards in the work area based on preliminary data. The PPE requirement for subsequent entries into a specific zone will be based upon the information gathered during the initial entries.

Selection of the most appropriate level of protection and combinations of respiratory protection is based on the following:

- Level of knowledge of on-site chemical, biological, and radiological hazards;

- Properties, such as toxicity, radioactivity, route of exposure, and matrix of the contaminants known or suspected of being present;

- Type and measured concentrations of the contaminants that are known or suspected of being present;

- Potential for exposure to contaminants in air, liquids, soils, or by direct contact with hazardous materials;

- Physical hazards; and

- Temperature extremes.

Personnel entering work zone are required to undergo training for the use of PPE. For routine work, Level D PPE or modified Level D is required. Where the scope of work requires a higher level of PPE, specific training will be provided.

PPE requirements will be identified in the JHA/RWP(s) and discussed with site workers prior to the start of work. Employees will be trained and approved following baseline medical examinations for the use of prescribed PPE. Radiological PPE requirements will be integrated with those established for potential nonradiological contaminants to ensure compatibility prior to the start of work. Sequential steps to facilitate the selection of PPE for hazardous waste site operations are as follows:

- Identify work area and job-specific hazard potential (e.g., chemical, radiological, physical, mechanical);

- Determine type of exposure for the work areas and specific work activities;

- Determine level of respiratory protection for the work areas and specific work activities, including cartridge selection, if appropriate;

- Evaluate the chemical resistant characteristics needed for the potential exposures and select clothing with the appropriate protection factor, evaluate potential physical hazards associated with the work areas and specific work activities (e.g., walking/working surfaces, electrical installations/lines, noise exposure) and select PPE to mitigate identified hazards;

- Consider climatic conditions and select PPE to accommodate the conditions (e.g., cooling units, insulated clothing/footwear);

- Evaluate potential biological hazards (e.g., snakes, insects) and select PPE to mitigate identified hazards;

- Evaluate type and level of work (e.g., heavy, moderate, light) and select PPE for the work; and

- Evaluate PPE for both chemical and radiological hazards when mixed waste is involved.

The specific levels of PPE and necessary components for each level are divided into four categories according to the degree of protection afforded. Following are general guidelines for use.

Level A: Worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.

Level C: Worn when the criteria for using air-purifying respirators are met, but a lesser level of skin protection is needed, and oxygen concentrations are between 19.5% and 23%.

Level D: Refers to work conducted without respiratory protection. This level should be used only when the atmosphere contains no known or suspected airborne chemical or radiological contaminants and oxygen concentrations are between 19.5% and 23%.

A sufficient quantity of drinking water or replacement fluids shall be maintained and accessible. In addition, a hand-wash area will be made available and all personnel are encouraged to wash their hands prior to eating, drinking, tobacco use, and at the conclusion of each day's work activities.

Eyewash stations will be available as necessary and will operate in accordance with manufacturer specifications. For portable eyewash stations, an antimicrobial agent will be used in accordance with the schedule specified by the manufacturer of the agent. The water in portable stations will be replaced weekly if no antimicrobial agent is added.

All safety equipment shall be inspected for serviceability by D&R Contractor project personnel, initially at the start of the project and periodically thereafter. Any defective equipment will be immediately taken out of service and replaced. In addition to periodic inspections, the presence of compliant, operable 10 lb ABC class fire extinguisher and first aid kit shall be verified by field personnel prior to the start of work and inspected in accordance with procedures and regulations. Safety equipment inspections shall be documented on equipment tags or in the project records.

6. MEDICAL SURVEILLANCE

The medical surveillance program provides for baseline, annual, and termination medical examinations for the following employees in accordance with 10 *CFR* § 851, *Worker Safety and Health* Program; 29 *CFR* § 1926.65, *HAZWOPER*; and CP3-HS-4002, *Implementation of the Occupational Medicine Program*.

Personnel performing HAZWOPER activities on this project must complete an annual HAZWOPER physical. The examining physician will document the worker's fitness for work and ability to wear a respirator.

Radiation workers, working under an RWP, may be required to submit a baseline bioassay, periodic bioassay during the project, and exit bioassay at the end of the project. Detailed explanation of the radiation worker requirements are described in CP2-RP-0001, *Four Rivers Nuclear Partnership, LLC, Radiation Protection Program for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, and referenced procedures.

7. EXPOSURE MONITORING

The D&R Contractor will perform exposure monitoring at the worksite as needed. This will be done to evaluate the effectiveness of engineered controls, to confirm appropriate PPE/respirator selection, and to measure employee exposures. Exposure monitoring shall be conducted pursuant to requirements of 10 *CFR* § 851 and 29 *CFR* § 1910. Requirements for radiological monitoring are contained in the D&R Contractor's Radiological Protection Program. All equipment will be maintained and calibrated per the manufacturer instructions.

Worker exposure monitoring and sampling shall be determined by industrial safety on a case-by-case basis. Information gathered during initial assessments shall be used to determine the initial PPE requirements. Information gathered in subsequent assessments shall be used to modify exposure monitoring as necessary to ensure worker safety and health and protection of the environment. General monitoring criteria are defined in the following subsections.

7.1 EMPLOYEE NONRADIOLOGICAL EXPOSURE MONITORING

Depending on the work activities being performed, real-time and/or integrated personal exposure sampling will be performed where there is a potential for employees to be overexposed. Exposure action levels shall be established for contaminants to which employees may reasonably be exposed. These action levels shall be developed based on regulatory drivers, industry standards, and sound industrial hygiene practice. Exposure monitoring data may be used to evaluate the effectiveness of engineering and administrative controls as well as to upgrade or downgrade PPE requirements.

The monitoring frequency and coverage may be increased should monitoring data indicate the potential for exposure to higher concentrations of chemicals than initially anticipated or if changes in the scope of work involve potential exposure to particularly toxic chemicals.

7.2 ENVIRONMENTAL AIR MONITORING

The expectation of significant contaminants becoming airborne and potentially dispersing during normal operations and maintenance is minimal. Industrial safety may initiate project boundary or perimeter monitoring as necessary to ensure protection of the public and the environment. The goal of such monitoring will be to determine whether any airborne contaminants are dispersing off the designated work area and to obtain data that would identify the need for corrective action in the work area.

8. TEMPERATURE EXTREMES

Typically the most common types of stress that affect field personnel are from heat and cold. Heat stress and cold stress are serious hazards to workers at waste sites. Personnel will be familiarized on the symptoms of heat and cold stress during training or in the plan-of-the-day/pre-job briefing. Activities related to heat and cold stress and work rest activities will be in accordance with CP3-HS-2000, *Temperature Extremes*.

- Cool water and disposable drinking cups or bottled water will be provided in a rest area and/or break trailer. Workers shall use safe work practices, including drinking plenty of fluids, such as water, taking rest breaks as necessary, and using the "buddy system" to monitor each other and watch for heat or cold stress symptoms.

8.1 HEAT STRESS

Heat stress is a condition that arises from a variety of factors, among the most important of these are ambient temperatures, relative humidity, level of effort required by the job, and clothing being worn by an exposed individual. An individual who is experiencing heat stress will tend to exhibit an array of measurable symptoms that can include an increased pulse rate, a greater rate of perspiration (except for heat stroke), and an increase in the individual's body temperature.

Heat-related disorders generally are classified in four basic categories:

(1) Heat Rash—Caused by continuous exposure to heat or humid air and can be recognized by the occurrence of small red pimples on the skin. Typically found in sensitive areas of the body where the potential for rubbing can occur (e.g., underarm, groin area).

(2) Heat Cramps—Caused by heavy sweating and inadequate electrolyte replacement. Signs to look for include muscle spasms and pain in the extremities, such as hands and feet, and in the abdomen.

(3) Heat Exhaustion—Caused by increased stress on various parts of the body, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs to look for include these:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness
- Nausea
- Fainting

(4) Heat Stroke—This is the most serious of all temperature related disorders or conditions since temperature regulation fails and the body temperature rises to critical levels. Immediate action should be taken to cool the body before serious injury or death occurs. Competent medical help should be obtained. Signs to look for include these:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Coma, in extreme situations

A number of steps can be taken to minimize the potential for heat stress disorders.

- Acclimate employees to working conditions by slowly increasing workloads over extended periods of time. Do not initiate site work activities with tasks having the most demanding physical expenditures.

- As practicable, conduct strenuous activities during cooler portions of the day, such as early morning or early evening.

- Provide employees with plenty of tempered water and encourage them to drink it throughout the work shift; discourage the use of alcohol during nonworking hours. It is essential that fluids lost through perspiration be replenished. Total water consumption should equal one to two gal/day.

- During hot periods, rotate employees wearing impervious clothing.

- Provide cooling devices, as appropriate. Mobile showers and/or hose-down facilities, powered air purifying respirators, and ice vests all have proven effective in helping prevent heat stress.

8.2 COLD STRESS

Persons working outdoors in low temperatures, especially at or below freezing, are subject to cold stress disorders. Exposure to extreme cold for even a short period of time can cause severe injury to the body surfaces and/or profound cooling, which can lead to death. Areas of the body that have high surface area-to-volume ratios, such as fingers, toes, and ears, are the most susceptible. Two basic types of cold disorders exist: localized (e.g., frostbite) and generalized (e.g., hypothermia).The descriptions for frostbite and hypothermia are provided below.

Frostbite can occur, in absence of hypothermia, when the extremities do not receive sufficient heat from central body stores. This can occur because of inadequate circulation and/or insulation. Frostbite occurs when there is freezing of fluids around the cells of the body tissues due to extremely low temperatures. Damage may result, including loss of tissue around the areas of the nose, cheeks, ears, fingers, and toes. This damage can be serious enough to require amputation or result in permanent loss of movement.

Hypothermia is described as when the temperature of the body drops. The first symptoms of this condition are uncontrollable shivering and the sensation of cold, irregular heartbeat, weakened pulse, and change in blood pressure. Severe shaking of rigid muscles may be caused by a burst of body energy and changes in the body's chemistry. Vague or slow, slurred speech, memory lapses, incoherence, and drowsiness are some of the additional symptoms. Symptoms noticed before complete collapse are cool skin, slow and irregular breathing, low blood pressure, apparent exhaustion, and fatigue even after rest. As the core body temperature drops, the victim may become listless and confused, and may make little or no attempt to keep

warm. Pain in the extremities can be the first warning of dangerous exposure to cold. If the body core temperature drops to about 85°F, a significant and dangerous drop in the blood pressure, pulse rate, and respiration can occur. In extreme cases, death will occur.

A number of steps can be taken to minimize the potential for cold stress:

- Individuals can achieve a certain degree of acclimation when working in cold environments as they can for warm environments. The body will undergo some changes that increase the body's comfort and reduce the risk of cold injury.

- Working in cold environments causes significant water losses through the skin and the lungs as a result of the dryness of the air. Increased fluid intake is essential to prevent dehydration, which affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, drinks, as well as soups, should be readily available.

- The skin should NOT be exposed continuously to subzero temperatures.

9. SITE CONTROL

9.1 BACKGROUND

The site control program at hazardous waste sites is used to control the activities and movement of people and equipment in order to minimize the potential for worker exposure to hazardous substances. The provisions of 29 *CFR* § 1926.65 require that an appropriate site control program be developed prior to the implementation of cleanup operations.

Site control for field activities will be determined by the Environmental Remediation Manager, Safety Specialist, and RADCON and communicated to the workers. Site control may be modified as new information becomes available based on the types of hazards that are found.

During the performance of work on this project, a Radiological Area generally will equate to an Exclusion (Hot) Zone, a Radiological Buffer Area generally will equate to a Contamination Reduction (Warm) Zone, and a Controlled or Clean Area generally will equate to a Support (Cold) Zone.

The overall objective of the site control component of this HASP is to specify procedures to minimize employee exposure and protect the public from hazardous substances and to prevent unauthorized access to the site.

9.2 VISITORS

Visitors to the PPO (including C-612, C-614, C-765, C-765-A, and EWs) or the C-613 Sediment Basin shall make a request to the Facility Manager of the facility and receive approval before entry to building. They must wear appropriate PPE prior to entry into the work area. Visitors are non-workers who are on the site only occasionally, for a specific or limited task such as observing work activities. Visitors also must have received the required training for the tasks being performed and entry must be approved by the Facility Manager.

9.3 ZONE DELINEATION

During the PPO project and C-613 Sediment Basin project, areas where activities are being performed that involve contact with uncharacterized material or performing activities that may pose a risk of overexposure above the established action levels will be considered the Exclusion (Hot) Zone. The Boundary Control Station areas, as applicable, will be considered the CRZ, and areas outside of the work area will be the Support Zone.

9.4 USING THE BUDDY SYSTEM

When performing activities in remote areas, workers must use the "buddy system" to ensure that rapid assistance can be provided in the event of an emergency. The buddy system is an approach used to organize work groups so that each worker is observed by at least one other worker. All personnel are responsible for ensuring that the buddy system is incorporated.

As part of the buddy system, workers should remain in close proximity and maintain visual contact with each other to provide assistance in the event of an emergency. The responsibilities of workers utilizing the buddy system include the following:

- Providing his/her partner with assistance,
- Observing his or her partner for signs of chemical or heat exposure,
- Periodically checking the integrity of his or her partner's PPE, and
- Notifying the front line supervisor or other site personnel if emergency assistance is needed.

9.5 COMMUNICATION NETWORK

Communication systems shall be established for both internal and external communication. Internal communication refers to communication among workers operating within the individual work areas of the site. Routine checks to verify proper operation should be addressed.

External communication refers to communication between on-site personnel. The primary means of external communication are cellular telephone and radio. An external communication system should be maintained in order to accomplish the following:

- Report progress or problems to management and
- Maintain contact with essential off-site personnel.

9.6 WORKER SAFETY PROCEDURES

As part of site control, procedures have been established to ensure worker safety. Worker safety procedures are incorporated into standard operating procedures and work packages that include work instructions and JHAs. Engineering controls and safe work practices will be implemented to reduce and maintain employee exposure levels at or below the OELs and published exposure limits for those hazardous substances at the site. PPE will be used to protect employees against possible exposure to hazardous substances when engineering controls and safe work practices are insufficient to maintain worker exposure at levels below established action levels.

10. DECONTAMINATION

Contamination of personnel, equipment, and/or material can occur from contact with radiological and/or hazardous material. When decontamination is required, appropriate procedures shall be followed to ensure effective decontamination is achieved and to minimize generation of mixed waste.

The overall objectives of decontamination are these:

- To determine and implement the decontamination method for personnel and equipment that is effective for the specific hazardous/radioactive substance(s) present;
- To ensure the decontamination procedure itself does not pose any additional safety or health hazards;
- To provide pertinent information on the locations and layouts of decontamination stations and equipment;
- To establish procedures for the collection, storage, and disposal of clothing and equipment that has not been completely decontaminated; and
- To provide for periodic evaluation of the effectiveness decontamination methods.

10.1 GENERAL CONSIDERATION

It is assumed that some of contamination concerns from the field activities will be radiological in nature. Disposable PPE and one-time use items may undergo radiological surveys prior to release for disposal as nonradioactive waste. Reusable equipment may be required to undergo a radiological survey prior to release from a radiological area. If hazardous waste is encountered, Industrial Safety and RADCON will assist project management in determining additional methods of decontamination. If clothing or equipment is contaminated with both radiological and hazardous material, mixed waste may be generated. Special precautions shall be taken to ensure this waste is handled, treated, stored, and disposed of properly.

10.2 PERSONNEL DECONTAMINATION METHODS

Personnel decontamination will be conducted in accordance with procedure CP4-RP-1103, *Personnel and Personal Effects Decontamination*. In the event of a chemical exposure, decontamination will be performed according to the available Safety Data Sheet or as directed by industrial safety. After the initial field decontamination, the potentially exposed employee will be transported to the appropriate medical facility for exposure assessment, if deemed necessary by industrial safety.

10.3 COLLECTION, STORAGE AND DISPOSAL PROCEDURES

All items (including clothing, equipment, liquids) that cannot be completely decontaminated shall be considered radioactive, hazardous, or mixed waste, as appropriate. Clothing and equipment shall be collected, treated, stored, and disposed of based on the type and level of contamination according to applicable federal, state, and local regulations. Drainage and/or collection systems for contaminated liquids shall be established and approved containers shall be used. Wash water shall be collected for proper disposal. Waste minimization will be encouraged; however, worker safety and health will take precedence.

11. EMERGENCY RESPONSE

This HASP applies to hazards expected to be encountered during work associated with C-613 and the PPO project and personnel need to be familiar with the appropriate action in case an emergency occurs on-site. The DOE Paducah Site Emergency Management Program is outlined in the CP2-EP-1000, *Paducah Site Emergency Management Plan for Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. The plan ensure the Paducah Site can respond effectively and efficiently to emergencies of any severity to ensure the consequences of all emergencies are minimized, and appropriate response measures are taken to protect the health and safety of all works and the public, protect the environment, and protect national security. Emergency implementing procedures have been developed and are maintained to ensure personnel actions are defined clearly.

Emergency response at PGDP is controlled by the PSS, and appropriate notifications must be made in accordance with the established plans and protocols. The following information provides guidance on the responsibilities and protocols to follow in case of an emergency at PGDP. Local emergency shelters and assembly points for specific work areas will be identified in work packages/JHAs and facility-specific emergency action plans (EAPs) that are communicated to affected personnel.

11.1 RESPONSIBILITIES

The PSS is responsible for the emergency response and communications to appropriate emergency responders.

D&R Contractor project personnel are responsible for reporting emergencies immediately and ensuring that the appropriate emergency response equipment is readily available at the work site and in proper working order. Depending on the activities and hazards, equipment and supplies to be maintained may include the following:

- First-aid kit
- Absorbents for spill control
- Emergency eyewash (in C-612 only)
- Fire extinguisher

11.2 REPORTING AN EMERGENCY

11.2.1 Discovery

The person who discovers an emergency should immediately contact the PSS and only attempt to establish control of the incident if the incident is minor in magnitude (i.e., using a fire extinguisher to put out an incipient fire, if trained to do so and can be accomplished in a safe manner).

All personnel should follow the guidelines in Table 2 upon discovery of an emergency condition.

Table 2. Guidelines for Emergency Conditions

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
Fire or Explosion	PSS	• Fire Alarm Pull Box • Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1, state, "Emergency Traffic, Emergency Traffic" • Phone—6211 and state, "This is an Emergency" • Call from a cell phone—(270) 441-6333 • Notify Facility Manager, LED, or Warden	If not in danger, stay in area to notify responders. Proceed immediately to the designated Evacuation Assembly Point through the nearest exit.	Stay upwind and clear of any fire.
Tornado/ Severe Weather	PSS	• Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1 and state, "Emergency Traffic, Emergency Traffic" • Phone—6211 and state, "This is an Emergency" • Call from a cell phone—(270) 441-6333 • Notify Facility Manager, LED, or Warden	Immediately proceed to the nearest designated Take Cover areas.	If outdoors and unable to find shelter, then lie flat in the nearest ditch or depression. Stay out of mobile structures. If outside, then avoid walls, power poles, downed power lines, spills, fires and any other hazards.
Earthquake	PSS	There is no need to report a substantial earthquake to the PSS. Slight ground shaking should be reported to C-300 for further investigation. • Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1 and state, "Emergency Traffic, Emergency Traffic" • Phone—6211 and state, "This is an Emergency" • Call from a cell phone—(270) 441-6333 • Notify Facility Manager, LED, or Warden	If indoors, then: • Watch for falling objects; • Get under a desk or table away from windows; or • Stand in doorway; or • Go to a small interior space. After the earthquake: • Report to designated Evacuation Assembly Point and follow instructions of emergency response personnel.	Avoid walls, power poles, downed power lines, and any other hazards.

Table 2. Guidelines for Emergency Conditions (Continued)

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
			• Stay out of the facility until directed to return by emergency response personnel. If outdoors, then: • Avoid walls, power poles, downed power lines, and any other hazards. • Proceed to designated Evacuation Assembly Point Follow instructions of emergency response personnel.	
Chemical Spill/Release	PSS	• Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1 and state, "Emergency Traffic, Emergency Traffic" • Phone—6211 and state "This is an Emergency" • Call from a cell phone—(270) 441-6333. • Notify Facility Manager, LED, or Warden	If directed to evacuate, then: • Immediately go to the Evacuation Assembly Point per the directions given in PA announcement. If directed to shelter-in-place, then: • Go indoors. • Close all exterior windows and doors. • If qualified, then turn off sources of ventilation. • Remain indoors until shelter-in-place is lifted.	DO NOT use a fire alarm pull box to report a hazmat release in a facility. This could place responders in harm's way by entering a facility to respond to a fire alarm. If evacuating, avoid any chemical spill or release. Stay upwind of chemical spills or releases. If sheltering-in-place, then remain indoors until released by the PSS.
Bomb Threat	PSS	• Phone—333 (Bell) • Phone—6211 and state, "This is an Emergency" • Notify Facility Manager, LED, or Warden	If Telephone Bomb Threat, then: • Obtain information about threat utilizing the Telephone Bomb Threat Guidance.	DO NOT use cell phones, radio, or fire alarm pull boxes.

Table 2. Guidelines for Emergency Conditions (Continued)

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
			• Keep caller talking and remain on line. **Do not** hang up even if caller does. • Listen carefully. Be polite and show interest. • Keep caller talking to learn more information. • Copy the phone number and letters on the display. • Write a note to a coworker to call the PSS, or when caller hangs up, notify the PSS immediately from a different phone. • Do not hang up and follow instructions. If bomb threat was recorded on a voicemail, then save the voice mail and notify the PSS. If written bomb threat, then: • Protect and preserve the written communication. • Handle the communication as little as possible. • Contact the PSS immediately and follow instructions.	

Table 2. Guidelines for Emergency Conditions (Continued)

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
			If E-mail bomb threat, then: • Save the e-mail. Contact the PSS immediately.	
Suspect Device or Package	PSS	• Phone—333 (Bell) • Phone—6211 and state, "This is an Emergency" • Notify Facility Manager, LED, or Warden	Receipt of suspicious letter or package: • Leave sealed, treat as suspect, and leave it undisturbed. • Avoid cell phone usage near the package. • Warn others to stay away from the device/package • Notify the PSS immediately and follow instructions. Suspicious letter or package characteristics: • No return address. • Poorly handwritten. • Excessive postage. • Misspelled words. • Stains. • Strange odor or sounds. • Distorted handwriting. • Homemade labels or cut-and-paste lettering. • Incorrect titles. • Foreign postage. • Restrictive notes such as "personal" or "private."	DO NOT use cell phones or radios in the vicinity of the package. DO NOT open or approach suspect devices or packages.

Table 2. Guidelines for Emergency Conditions (Continued)

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
			• Unexpected delivery. • Rigid, uneven, or lopsided packaging.	
Suspicious Activity/ Intruder/ Active Shooter	PSS	When it becomes safe to do so, contact the PSS by using the following: • Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1 and state, "Emergency Traffic, Emergency Traffic" • Phone—6211 and state, "This is an Emergency" • Call from a cell phone—(270) 441-6333.	Run • Have an escape route and plan in mind. • Leave your belongings behind. • Evacuate regardless of whether others agree to follow. • Remember that moving individuals are harder targets to accurately engage. • When exiting the building, keep your hands visible at all times. Hide • If you are unable to run, hide in an area where you can't be seen by the shooter. • Lock the door(s) and/or block the entry into the room. Attempt to select a location with a robust door (no glass) if possible and time permits. • Hide behind furniture (the more robust the better). • Silence your cell phone. • Remain quiet.	Responding security or law enforcement may not know who you are, so expect to be treated as a possible threat and obey all commands (e.g., hands up or on head as you approach them).

Table 2. Guidelines for Emergency Conditions (Continued)

Type of Emergency	Emergency Contact	Notification Method	Immediate Personnel Actions	Cautions
			Fight • If confronted directly by the shooter and you feel our life is in imminent danger, violently attack the shooter. • Use all means necessary to incapacitate the shooter. • Act with physical aggression (throw items at the shooter). • Fully commit to your own survival.	
Medical Emergency	PSS	• Phone—333 (Bell) • Radio—Turn knob to position 16; call for Alpha 1 and state "Emergency Traffic, Emergency Traffic." • Phone—6211 and state "This is an Emergency" • Call from a cell phone—(270) 441-6333.	Initiate first aid treatment, if properly trained, and await Emergency Medical Services personnel to arrive.	DO NOT attempt to transport an injured person to on-site or off-site medical facilities.

11.2.2 Initial Emergency Response

When an emergency occurs, someone must assume responsibility for the management of the scene and the protection of personnel. Initially, this is the person who discovers the emergency, until the arrival of emergency response personnel, if safe to do so.

For personnel injury or illness, the D&R Contractor will ensure that at least one person with current training in first aid and cardiopulmonary resuscitation is present on-site during all field activities. This individual will provide minor first aid until emergency response personnel arrive and assume emergency response duties or it is determined to transport the injured to an on-site or off-site medical facility. Determinations and incident reporting will be made according to CP3-OP-2024, *Initial Incident/Event Reporting*.

Emergency accountability will be conducted in accordance with CP3-EP-1000, *Personnel Accountability*.

11.3 CONTINGENCY PLAN FOR SPILLS

A spill is defined as an unidentified or unanticipated release of a substance(s) to air, surface water, groundwater, soil, pavement, or other location where the substance presents a potential hazard or environmental impact.

11.3.1 Reporting a Spill

When a spill is discovered, the Environmental Remediation Manager and Environmental Stewardship Manager, Pump-and-Treat Manager, or Safety Specialist will contact PSS immediately and convey as much information as possible (e.g., material involved, estimated quantity spilled/affected, location, affected personnel, other hazardous conditions).The project personnel shall follow CP3-ES-0003, *Environmental Incident Reporting*, and assist in the completion of the Environmental Incident Report.

11.3.2 Protective Actions for Spill

An effort will be made to stop the release and contain the spill using materials in the on-site spill response kit, only if it is safe to do so and if no unprotected exposures occur. Table 2 contains the telephone contact information for spill emergency notification.

In the event that personnel are exposed to hazardous chemicals or radioactive materials, appropriate emergency response action will be taken to remove the contaminated clothing. An emergency shower and eyewash station at C-612 will be used to flush exposed skin and eyes, respectively. This emergency equipment will be maintained in a readily accessible location adjacent to the active work area. A temporary emergency shower and eyewash station will be provided in other locations (C-614, C-765, C-765-A, extraction wells, and C-613) as needed during work activities and as directed in work control documents.

If an acute exposure to airborne chemicals occurs or is suspected and the affected personnel are unable to escape the work zone, the Environmental Remediation Manager and Environmental Stewardship Manager, Pump-and-Treat Manager, or Safety Specialist will immediately contact PSS for assistance. Rescue operations will not be performed unless the rescuers are dressed in the appropriate protective equipment.

D&R Contractor project management will be responsible for ensuring all spills of hazardous materials are properly cleaned up and disposed of, including any material generated from the spill, unless otherwise directed.

The Environmental Remediation Manager and Environmental Stewardship Manager, Pump-and-Treat Manager, or Safety Specialist has the following responsibilities:

- Ensuring that spill containment is performed safely,
- Providing all known information to PSS to ensure proper response, and
- Ensuring that decontamination measures for exposed personnel are conducted safely and promptly.
- Ensuring that, if personnel are exposed to airborne chemicals and are unable to escape the work zone, rescue is not attempted unless rescue personnel are dressed in the appropriate protective equipment.

11.4 CONTRACTOR ACCOUNTABILITY/ASSESSMENT DRILLS

The D&R Contractor will participate in all PGDP accountability/protective action drills in accordance with site procedures and training. The Environmental Remediation Manager, Environmental Stewardship Manager, Pump-and-Treat Manager, Safety Specialist, or designee will be responsible for accounting for all field personnel (including subtier subcontractor personnel) and reporting any unaccounted-for personnel through their line management or the PSS in accordance with CP3-EP-1000, *Personnel Accountability*. Figure 4 shows the evacuation assembly point and evacuation routes for C-612.

12. CONFINED SPACE ENTRY

All confined space entries shall be in accordance with OSHA 29 *CFR* § 1910.146; CP3-HS-2055, *Confined Space*; and the following requirements. The requirements provided below are not intended to be all-inclusive.

A confined space is considered to be any space that is large enough and so configured that it can be bodily entered to perform work, has limited or restricted means of entry or exit, and is not designed for continuous employee occupancy. Entry into a confined space will be considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Permit-required confined spaces are those spaces that have one or more of the following characteristics:

- Contain or have the potential to contain a hazardous atmosphere;
- Contain a material that has the potential for engulfing an entrant;
- Have internal configurations such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; or
- Contain any other serious safety or health hazards.

13. SPILL CONTAINMENT

The intent of this section of the HASP is to meet the requirements of 29 *CFR* § 1926.65. The spill containment program shall address all hazardous substance spill scenarios that are likely to occur at the site. In addition, the spill containment program also shall provide procedures to contain and isolate the entire volume of any hazardous substance spilled in the course of a transfer, accident, or on-site release. Response to such an incident is specified in Section 11, Emergency Response.

In order to implement successful spill containment during operations, personnel should be aware of proper storage conditions and recognition of abnormal site conditions, current operations, and planned activities. Personnel shall be aware and carefully examine all hazardous materials on-site for where and how the materials are as follows:

- Stored (e.g., location, type of container);
- Handled (e.g., processed, used, transferred); and
- Transported (e.g., mode, routes).

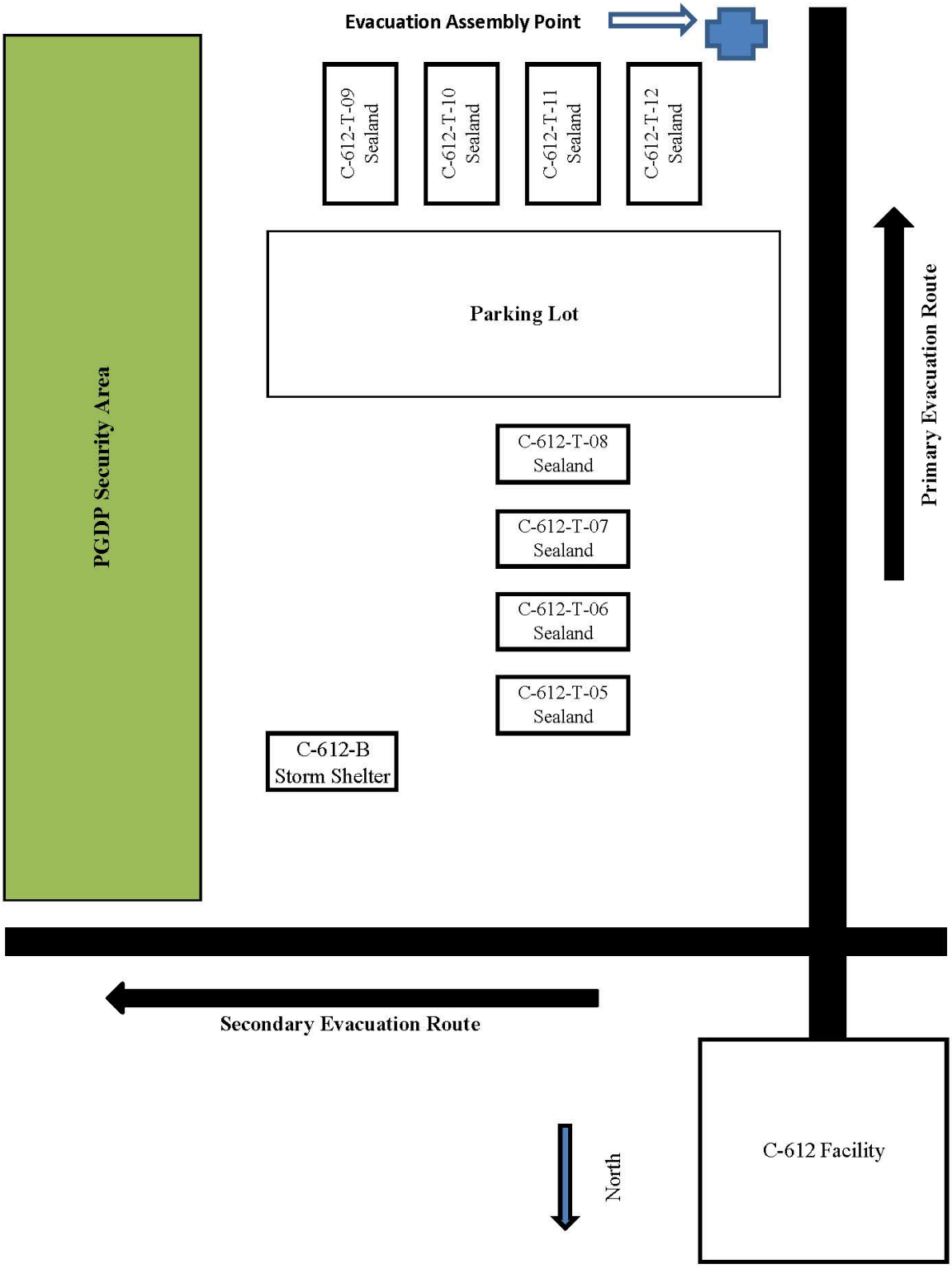

Figure 4. C-612 Evacuation Assembly Point and Evacuation Routes

Project personnel are responsible for each area or activity and should analyze the conditions for potential accidental releases or spills. Examples of situations that have potential for spill or release are as follows:

- Bulging or corroded containers;
- Transfer line connections (e.g., leaking seals, misaligned connections);
- Metal fatigue of storage tanks;
- Leaking or inoperable valves; and
- Poor housekeeping (e.g., drums improperly staged).

Many potential spills can be avoided through application of proper engineering controls to hazards identified in the assessment. In areas where storage, handling, and transportation activities occur, preplanning to contain the largest volume of material that could be released in the area will minimize worker exposure. The containment measure shall be appropriate to the hazardous material(s) identified and shall be installed in the area or located nearby. The following examples are measures that are most frequently used:

- Salvage containers (e.g., overpack drums);
- Bermed, lined pads;
- Concrete pad and dike;
- Inflatable containment (e.g., "kiddie" pools, bladders); and
- Associated equipment (e.g., pumps, hoses, shovels, hoists).

Spill containment equipment and fixtures shall be maintained and replaced properly, as necessary.

14. RECORDKEEPING

Proper safety recordkeeping is essential in the implementation of the HASP. The forms associated with the recordkeeping must be completed in an accurate, timely fashion. Completed forms will be kept and maintained by the project.

14.1 RECORDS AND LOGS

The operations personnel will maintain a record of each day's activities as appropriate. Other relevant data and field information will be recorded on separate forms for air monitoring, sampling, equipment calibration, inspections, and incident reporting.

14.2 SAFETY INSPECTIONS

Safety inspections are required by various tiers of the management structure. Each safety inspection is to be documented. Management and independent assessments shall be conducted in accordance with CP3-QA-1003, *Management and Self-Assessment*. The primary responsibilities of the assessor include the following:

- Interviewing employees with regard to safety and health recommendations and how these recommendations might be integrated into the performance of work;

- Observing and correcting unsafe conditions and acts; and

- Verifying that issues and corrective actions have been assigned to a responsible employee and implemented in accordance with CP3-QA-1003, *Management and Self-Assessment*.

Positive safety observations and safety issues also should be documented. A list of corrective action items will be maintained showing the corrective action, responsible person, and the date action is to be completed. Completed reports are to be given to D&R Contractor Management.

14.3 ACCIDENT/INCIDENT REPORTING AND INVESTIGATION

Personnel should report all accidents and incidents, no matter how minor, to the Environmental Remediation Manager, Environmental Stewardship Manager, Facility Manager, Manager, and/or Safety Specialist as soon as possible. The Environmental Remediation Manager, Environmental Stewardship Manager, or the Facility Manager shall immediately notify D&R Contractor management of any event or condition that adversely affects or may adversely affect DOE, D&R Contractor, subcontractors, the public, or government property. These events may include any accident/incident that results in employee injury/illness, accident precursor that could result in injury/illness or damage to government equipment and facilities, potential Price-Anderson Amendment Act noncompliance, or any other unplanned event that may be a violation of a regulatory requirement or that may be viewed negatively by the public or DOE. In situations where an accident or incident has occurred, the scene may not be altered without D&R Contractor management concurrence, unless alteration is necessary to protect human life, mitigate an immediate hazard, or stop a spill in progress.

D&R Contractor project management will investigate and report each accident or incident involving employee injury/illness, damage to government property (including vehicles), or any precursor incident that has the potential to result in these undesired outcomes. For personnel illness/injury or industrial safety related issues, a Safety Notification Report shall be completed and provided to the D&R Contractor Safety and Training manager in a timely manner after the event. If radiological/contamination control issues are involved, a radiological anomalous condition report shall be initiated as well as if environmental issues are involved an Environmental Incident Report shall be initiated in accordance with CP3-ES-0003, *Environmental Incident Reporting*. Such reports shall provide a description of the incident, direct and contributing causes, immediate corrective actions taken and planned measures that will be taken to prevent recurrence of similar incidents. The D&R Contractor Safety and Health manager shall maintain a first aid log listing occupational injuries/illness involving D&R Contractor, subcontractor employees, or anyone else injured as a result of work performed under this contract. Investigation and reporting shall be conducted in accordance with CP3-OP-2024, *Initial Incident/Event Reporting*.

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