Appendix A

PBF-16: SPERT-II Leach Pond
Field Sampling Activities

Appendix A

PBF-16: SPERT-II Leach Pond Field Sampling Activities

A-1. INTRODUCTION

This Operable Unit (OU) 5-12 Remedial Design/Remedial Action (RD/RA) Health and Safety Plan (HASP) appendix establishes the procedures and requirements that will be used to eliminate and/or minimize health and safety risks to personnel working on the Power Burst Facility (PBF)-16: Special Power Excursion Reactor Test (SPERT)-II Leach Pond Field Sampling Activities. For information on the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of this HASP.

A-1.1 INEEL Site Description

For details on the location and operational history of the Idaho National Engineering and Environmental Laboratory (INEEL) and the PBF area, see Section 1 and Figures 1-1 and 1-2 of this HASP.

A-1.2 PBF-16: SPERT II Leach Pond Background and Description

Remedial action is required for the PBF-16 SPERT-II Leach Pond to address the risk to ecological receptors posed by contaminated soil. Site investigations and the nature and extent of contamination of site risks are presented below.

The PBF-16 site is a fenced, unlined surface impoundment with approximate dimensions of 70 × 51 m (230 × 167 ft), located south of the SPERT-II Reactor Building. From 1959 to 1964, the leach pond was used for disposal of demineralizer effluent, water softener waste, emergency shower drain water, and discharges from the floor drains from the reactor building. From 1964 until 1990, the only discharge to the pond was clean water from the PBF maintenance shop air compressor (Hillman-Mason et al. 1994). The compressor was removed in 1994, and no water has been discharged to the SPERT-II Leach Pond for several years (Gerber 1999).

A-1.3 Source, Nature, and Extent of Contamination

Characterization activities were conducted in 1982 to complete decontamination and dismantlement (D&D) of the deactivated SPERT-II facility. The pond area was surveyed with handheld radiation detection instrumentation; additionally, vertical profile sampling and surface soil and mud samples were collected and analyzed for radiological contamination. Two water samples were collected from the pond, and clippings from the new growth of various plants and trees in the pond area were taken. In addition, smears were taken from the gate, pipe outlet, concrete apron, and from eight of the floor drains inside the reactor building. All samples and smears were sent to the Test Reactor Area (TRA) Radiation Measurements Laboratory (RML) and analyzed for gamma-emitting radionuclides. Additionally, two of the soil samples were sent to the Exxon Nuclear Idaho Company laboratory where they were analyzed for gross alpha, gross beta, Sr-90, U-234, U-235, U-238, Pu-238, and Pu-239/240 (DOE-ID 2000).

The radiological survey and soil sample analytical results did not show any detectable activity distinguishable above the reported INEEL background values. The analytical results from the water, mud, and vegetation samples were either below the instrument detection limits or below the INEEL background values. Additionally, no detectable activity was measured on any of the smears (DOE-ID 2000).

An analysis of nonradiological contaminants at the PBF-16 Leach Pond was conducted in October 1983. The contaminants analyzed for were based on past facility operations and included arsenic, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, and toxaphene. The analysis results indicated that the leach pond did not contain total contaminant concentrations in excess of the toxicity characteristic leaching procedure limits as defined under the Resource Conservation and Recovery Act (RCRA); however, lead and mercury were detected in concentrations exceeding background values with maximum concentrations of 32 mg/kg for lead and 0.71 mg/kg for mercury (Hillman-Mason et al. 1994). Though lead was detected at 32 mg/kg, risk could not be quantified because toxicity data for lead have not been developed. However, the maximum detected lead concentration is considerably less than the Environmental Protection Agency (EPA) 400-mg/kg screening level (EPA 1994). Therefore, lead was not identified as a contaminant of concern (COC) based on human health risk. Mercury was identified as a COC for PBF-16 based on the results of the Ecological Risk Assessment (ERA) (Holdren et al. 1999). A summary of the information about the COC in soil at PBF-16 is given in Table A-1.1.

A-1.4 Scope of Work

The scope of work involves the collection and analysis of surface and subsurface soil samples in the PBF-16 Leach Pond. The objectives of this field sampling event include the following:

- Verify whether mercury contamination is present in the PBF-16 Leach Pond area at levels of 0.5 mg/kg or greater
- Define the extent of mercury contamination exceeding the 0.5 mg/kg remedial action goal.

The project is being conducted in accordance with the requirements set forth in the *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area* (DOE-ID 2000). Refinement of the extent of contamination is necessary to minimize the volume of soil that will be excavated and disposed of during the OU 5-12 remedial action.

As shown in Figure A-1.1, only a small portion, approximately 20% of the surface area of the pond, actually received water. The pond area was divided into two strata based on historical use (see Figure A-1.1). Stratum 1 is the area of the pond that received discharge. Stratum 2 is the area of the pond that most likely did not receive any discharge during operations.

Table A-1.1. Soil concentrations for the contaminant of concern at PBF-16.

Contaminant of Concern	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Frequency of Detection	Background Concentration (mg/kg)	Exposure Point Concentration (mg/kg)	Statistical Measure
Mercury	ND[a]	0.71	ND	0.05[b]	0.71	Maximum

a. ND = not determined. Records of the 1983 sampling by decontamination and dismantlement personnel were not located. The maximum concentration was taken from the Track 2 report (Hillman-Mason et al. 1994).

b. The background value for composited samples is from Rood, Harris, and White (1996).

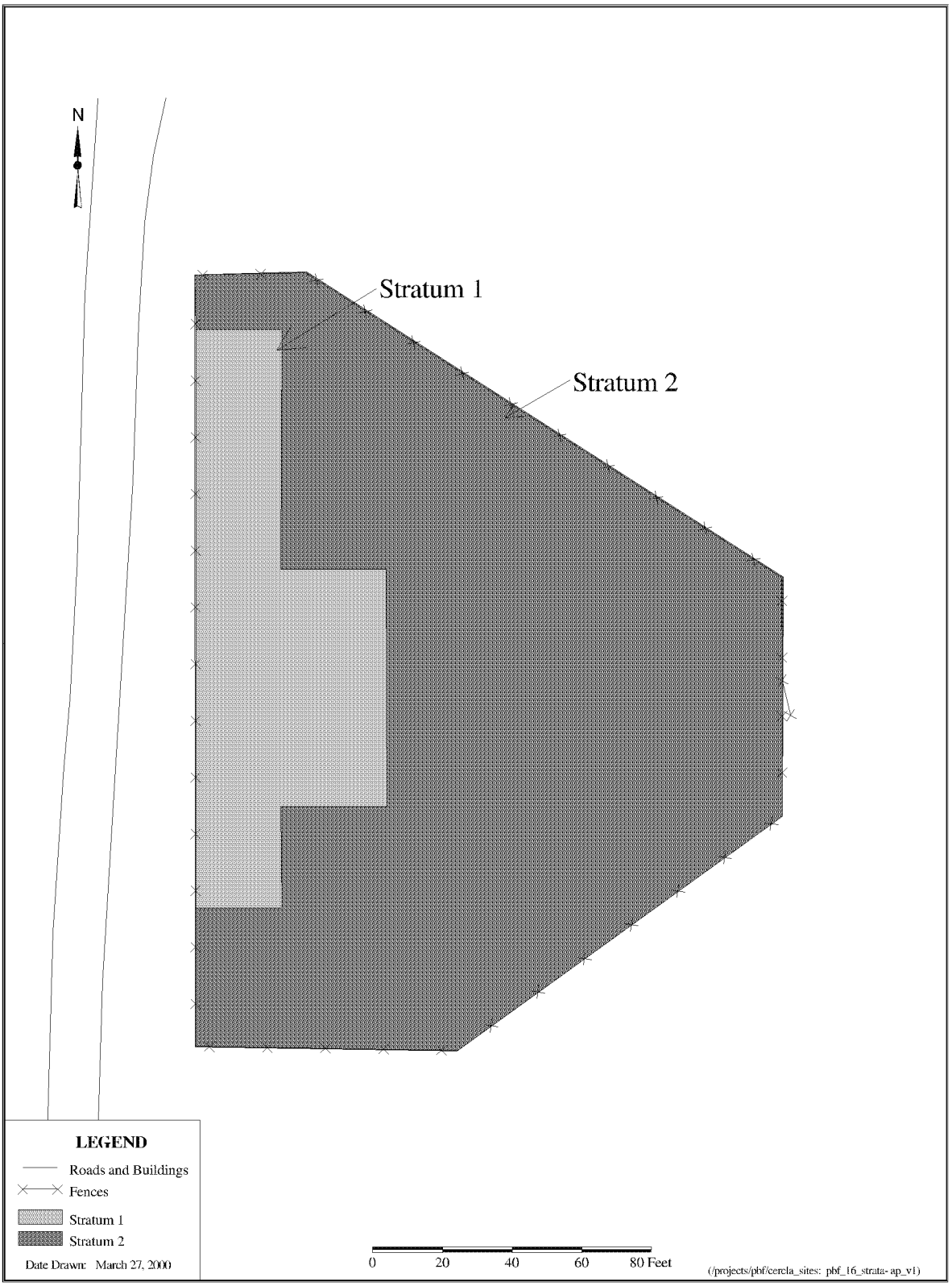

Figure A-1.1. PBF-16 Leach Pond and the two identified strata.

Figure A-1.2 shows the two strata and the new sampling locations within the strata. Systematic grid sample points in Stratum 1 are identified as "S1-1" through "S1-13," and the biased locations are identified as "A-1" and "A-2." Similarly, systematic grid sample points in Stratum 2 are identified as "S2-1" through "S2-13." The surface soil at each sample location will be screened for mercury hot spots (>30 mg/kg) using a handheld field portable x-ray fluorescence spectrometer. If a sample location is identified as a hot spot, then subsurface samples will be collected at the following depth intervals: 15 to 45 cm (6 to 18 in.), 1.5 to 2.1 m (5 to 7 ft), and at the soil/basalt interface.

Surface soil samples for mercury will be collected at all locations from 0 to 15 cm (0 to 6 in.). Additionally, subsurface soil samples for mercury will be collected at all locations within Stratum 1 at a depth interval of 15 to 45 cm (6 to 18 in.). Further, subsurface composite samples will be collected at the two biased locations, A-1 and A-2, at a depth interval from 1.5 to 2.1 m (5 to 7 ft), and subsurface samples will also be collected at the soil/basalt interface, which is estimated at 3 m (10 ft). A total of 47 soil samples will be collected during this field-sampling event, excluding the quality assurance/quality control samples. The sampling steps are detailed in the following subsections.

A-1.4.1 Sample Point Survey Designation

Prior to sampling, all sample points will be surveyed and marked in accordance with the requirements set forth in Management Control Procedure (MCP)-227, "Sampling and Analysis Process for Environmental Management Funded Activities" (INEEL 1999f). If an alternate sample location is selected due to field constraints, the location will be marked and surveyed as per MCP-227.

A-1.4.2 Field Screening for Mercury Hot Spots

The surface soil at each sample location will be screened for mercury hot spots (>30 mg/kg) using a handheld field portable x-ray fluorescence spectrometer. If a sample location is identified as a hot spot, then subsurface samples will be collected at the following depth intervals: 15 to 45 cm (6 to 18 in.), 1.5 to 2.1 m (5 to 7 ft), and at the soil/basalt interface.

A-1.4.3 Surface Soil Sampling

Surface soil samples will be collected from the two identified strata within the PBF-16 Leach Pond area for total mercury analysis. The samples and subsequent analytical results will be used to define the extent of mercury contamination above the remedial action goal of 0.5 mg/kg.

The surface soil samples will be collected following the procedures outlined in the current revision of Standard Operating Procedure (SOP) 11.12, "Soil Sampling" (INEEL 1996c). All surface samples to be analyzed for mercury will be spatial composites of five subsamples collected from 1 by 1-m (3.3 by 3.3-ft) plots. The samples will be collected between 0 to 15 cm (0 to 6 in.) in depth using a decontaminated trowel, spoon, shovel, or hand auger. Notation will be made in the sampling logbook as to which sampling method was employed. A composite of five surface samples will be collected at the four corners and the center of the plot.

Each subsample will be sieved, using a stainless steel spoon, through a 2-mm (0.08-in.) mesh stainless steel screen into a disposable aluminum pan. This procedure will be conducted at each of the five subsample points to remove all large rocks and debris. Following the collection of all subsamples, the soil in the aluminum pan will be thoroughly mixed with the stainless steel spoon. Sample containers will be filled from this composite. Sample material left over will be returned to the sample point from which it originated.

For detailed information regarding the sample collection activities, refer to INEEL/EXT-2000-00396, *Field Sampling Plan for the PBF-16 (SPERT-II) Leach Pond*.

A-2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. The names of the individuals in key roles at the Site and lines of responsibility and communications are shown in the project organizational chart (Figure A-2.1). Descriptions and responsibilities of the key site personnel are detailed in Section 2 of this HASP.

A-3. RECORDKEEPING REQUIREMENTS

Section 3 of this HASP provides the information regarding safety and health related recordkeeping requirements for the activities conducted per this appendix. Additional sample collection records and documentation will be maintained per the requirements in *Field Sampling Plan for the PBF-16 (SPERT-II) Leach Pond*.

A-4. PERSONNEL TRAINING

All site personnel will receive training as specified in Section 4 and Table 4-1 of this HASP as a minimum. Before beginning work at the site, site-specific training will be conducted by the Field Team Leader (FTL) or Health and Safety Officer (HSO) including a complete review of this HASP and this appendix. This review will include time for discussion and questions. Upon completing site-specific training, personnel will sign the training acknowledgement form indicating that they have received this training, understand the tasks and associated hazards, and agree to follow all HASP and other safety requirement documents. The FTL will be responsible for verifying all personnel working at the site have completed the training specified in Table 4-1 prior to permitting personnel to enter the work site.

A-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based upon the existing site-specific sampling information available for this project, there are no additional Occupational Medical Surveillance Program requirements. Refer to Section 5 of this HASP for information regarding the INEEL Occupational Medical Surveillance Program requirements.

A-6. ACCIDENT PREVENTION PROGRAM

The field sampling activities at the PBF-16 Leach Pond will be performed under approved documentation written and authorized per the requirements of MCP-3562, "Hazard Identification, Analysis and Control of Operational Activities." Refer to Section 6 of this HASP for information regarding the Accident Prevention Program requirements.

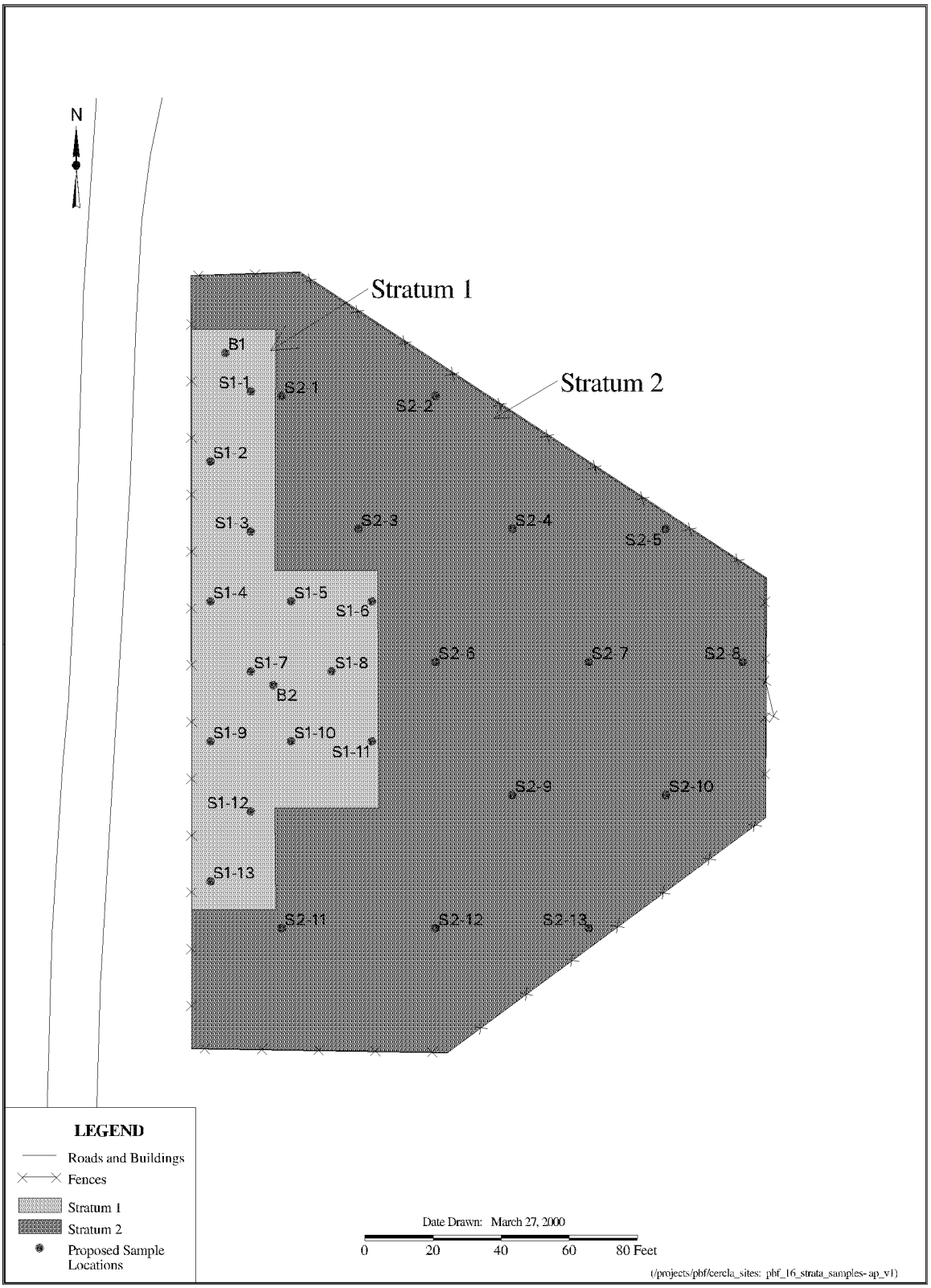

Figure A-1.2. Post-Record of Decision sample locations at PBF-16 Leach Pond.

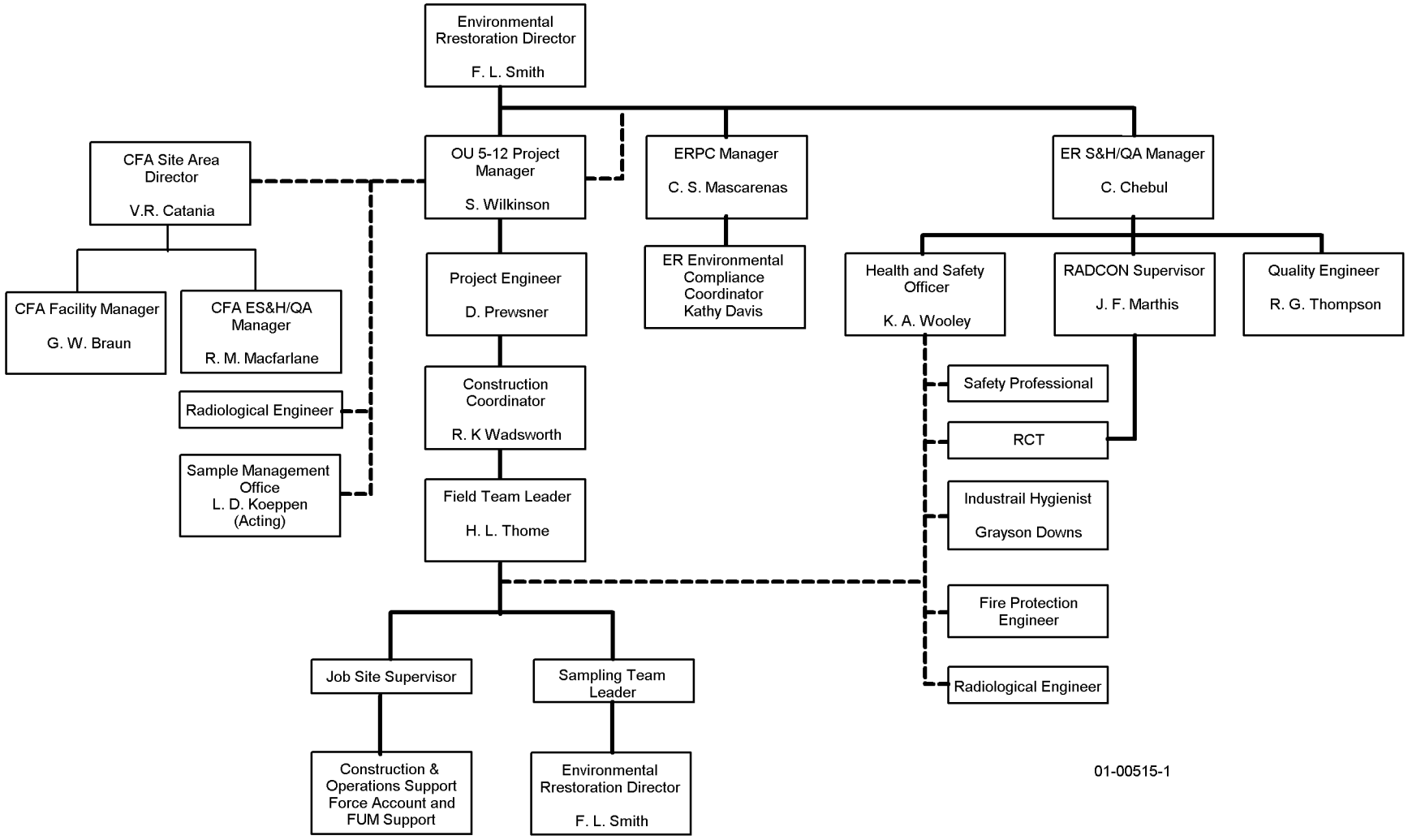

Figure A-2.1. Organizational chart for PBF-16 SPERT-II Leach Pond field sampling activities.

A-7. SITE CONTROL AND SECURITY

Refer to Section 7 for definitions and descriptions of the various work zones and areas used to control site access and work tasks. The FTL and HSO will be responsible for working with the Industrial Hygienist (IH), Safety Engineer (SE), and Radiological Control Technician (RCT) to establish the site boundaries for the field sampling activities at the PBF-16 Leach Pond. The site will consist of an Exclusion Zone established in the fenced area where sampling is performed. A Contamination Reduction Zone/Contamination Reduction Corridor (CRZ/CRC) will be established at the gate entrance into the PBF-16 Leach Pond. A Support Zone will be established outside of the CRZ/CRC to provide a clean area for materials staging. Figure A-7.1 provides a general map for establishing the zones.

A-8. HAZARD ASSESSMENT

Section 8 of this HASP provides general information regarding the types of hazards that may be encountered while performing OU 5-12 RD/RA work. Specific hazards associated with the PBF-16: SPERT-II Leach Pond Field Sampling Activities (as identified on the Hazard Screening Checklist per MCP-3562) are presented in this section.

Table A-8.1 below summarizes the anticipated activities to be performed and the associated hazards.

Section 8 of this HASP provides specific information on manual material handling, equipment movement, heat/cold stress, working surfaces, biological hazards, and radiation exposure. It is important for personnel to review this information and understand the potential hazards.

Table A-8.1. Activities and associated hazards.

Activity or Task	Associated Hazards or Hazardous Agent
Mobilization	Equipment movement/vehicle traffic
	Heat/cold stress
	Manual material handling Slip/trip hazards due to walking/working surface
Perform Sampling Activities	Radiation exposure (Niton Analyzer source) Chemical/inorganic contaminants (mercury and lead) Equipment movement/vehicle traffic Repetitive motion/lifting during sample collection Slip/trip hazards due to walking surfaces
	Biological hazards
	Heat/cold stress
Demobilization	Equipment movement Slip/trip hazards due to walking surfaces Heat/cold stress Manual materials handling

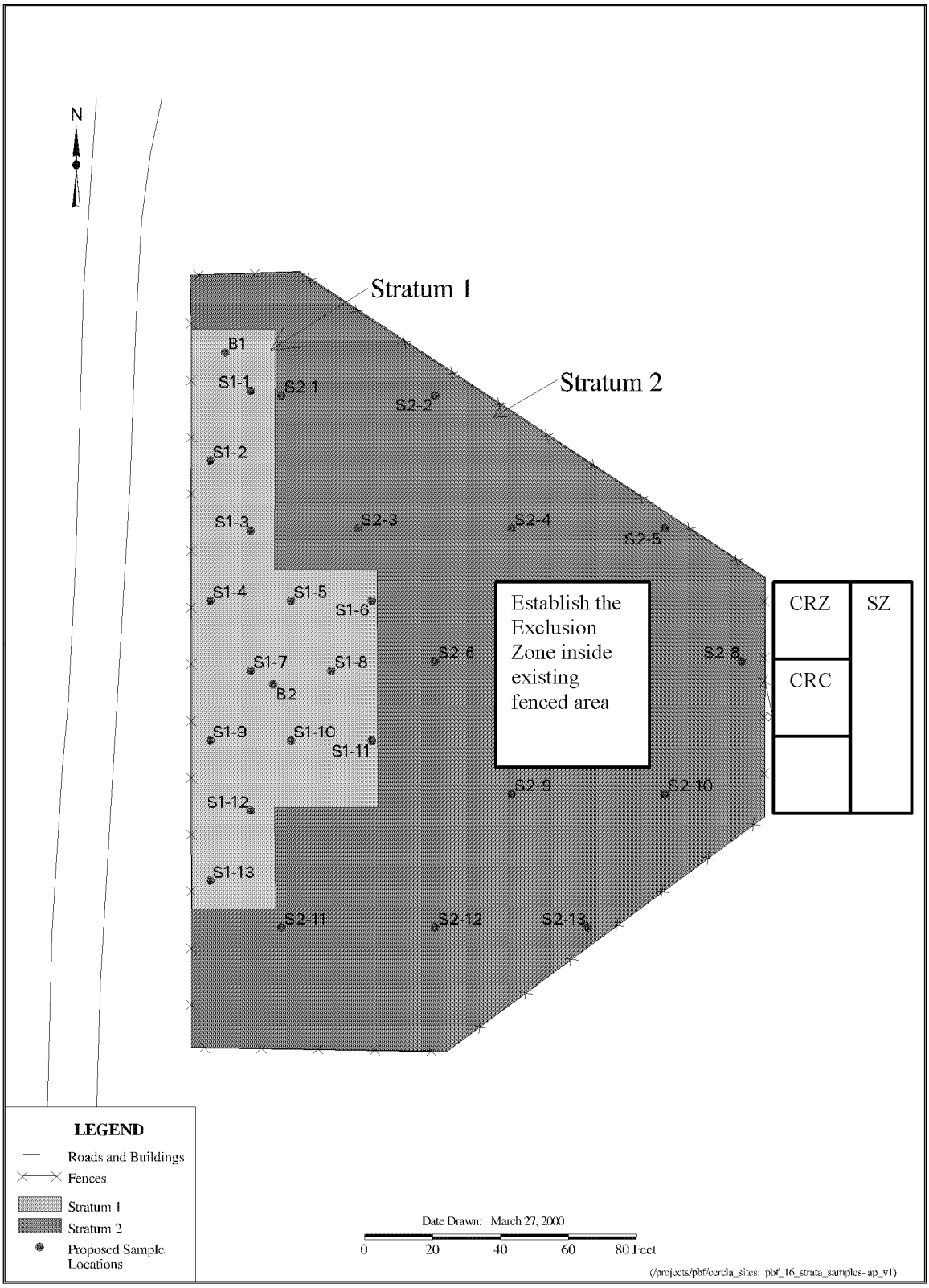

Figure A-7.1. Proposed work zones for PBF-16 Leach Pond field sampling activities.

Previous soil sampling data indicate low levels of lead and mercury present in the soil. Based upon these data, personnel work practices, personal protective equipment (PPE), and equipment design will be important to prevent potential inhalation, ingestion, and adsorption of these potential contaminants. The project IH will specify any special precautions or sampling requirements and ensure controls are adequately documented in the Safe Work Permit (SWP) or Job Safety Analysis (JSA) for potential lead and mercury exposure.

Personnel will be potentially exposed to mercury while working at the OU 5-10 RD/RA PBF-16 Sampling project site. Table A-8.2 lists the contaminants, route of exposure, symptoms of overexposure, and overexposure potential.

A-9. PERSONAL PROTECTIVE EQUIPMENT

Modified Level D personal protective equipment will be used during the PBF-16 Leach Pond sampling activities per table A-9.1 below.

A-10. DECONTAMINATION PROCEDURES

Every effort will be made to prevent the contamination of personnel and equipment through the use of engineering controls, good work practices, and personal protective equipment. The IH will specify PPE requirements to prevent personnel contamination as well as specifying the sampling methods and decontamination process used. For information describing contamination control and prevention and emergency decontamination procedures, refer to Section 10 of this HASP.

A-11. EMERGENCY RESPONSE PLAN

The FTL and HSO will be responsible to ensure Section 11 of this HASP is implemented prior to commencement of this project. This includes ensuring proper facility and emergency organization notifications are made prior to field mobilization. The following project-specific emergency response equipment will be available on site per Table A-10.1.

Table A-8.2. Potential contaminants.

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
PBF-16	Mercury	Inh, Ing, Abs, Contact	Ataxia, dysarthria, vision/hearing, spastic/jerky movements, dizziness, salivating, nausea, vomiting, diarrhea, constipation, skin burns, emotional distress/central nervous system, kidneys, eyes, skin	Low

Table A-9.1. PPE Requirements for PBF-16 Leach Pond sampling activities.

Task or Assignment	Level of PPE	Modifications and Comments
1. Project Mobilization	a) Level D	a) All mobilization tasks in the support zone (SZ) will be conducted in Level D PPE meeting the minimum Environmental Restoration (ER) field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	b) Modified Level D	b) Modification will be per the task SWP for chemical concerns in the exclusion zone as determined by the IH.
2. Performing Field Work	Level D—(initially) Modified Level D	Modified Level D (protective clothing) per the task SWP for chemical concerns in the exclusion zone as determined by the IH.
3. Demobilization	a) Level D	a) All demobilization tasks in the SZ will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	b) Modified Level D	b) Modification will be per the task SWP for chemical concerns in the exclusion zone as determined by the IH.

Table A-10.1. PBF-16 Emergency response equipment.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers[a]	Support zone, project vehicle	HSO	Monthly
First aid supplies	Support zone	HSO	Weekly
Eyewash station	Support zone	HSO	Monthly
Hazardous materials spill kit	Project vehicle	FTL	Monthly
Communication equipment	FTL or project vehicle	FTL	Daily

a. Consult the assigned safety and fire protection engineer to determine appropriate type and quantity of fire extinguisher(s).

Refer to Section 11 of this HASP for the emergency contacts and notification requirements. The FTL will ensure all personnel are aware of emergency information contained in Section 11 of this HASP during the project-specific HASP training.

Appendix B

OU 5-12 RD/RA Tank System Remediation Projects

Appendix B

OU 5-12 RD/RA Phase I Tank System Remediation Projects

B-1. INTRODUCTION

This Operable Unit (OU) 5-12 Remedial Design/Remedial Action (RD/RA) Health and Safety Plan (HASP) appendix establishes the procedures and requirements that will be used to eliminate and/or minimize health and safety risks to personnel working on the Tank Remediation Projects. For information on the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of this HASP.

B-1.1 INEEL SITE DESCRIPTION

For details on the location and operational history of the Idaho National Engineering and Environmental Laboratory (INEEL) and the Power Burst Facility/Auxiliary Reactor Area, see Section 1 and Figures 1-1 and 1-2 of this HASP.

B-1.2 Scope of Work

Site remediation involving the seepage pit, manholes, the distribution box, the chlorination tank, septic tanks, the radioactive waste tank, and the associated piping will occur at locations in Auxiliary Reactor Area (ARA)-I/-II, ARA-III, and ARA-IV. For purposes of this HASP, these activities will be divided into the following related tasks: (1) Remediation of septic systems at ARA-07, ARA-08, ARA-13, and ARA-21; (2) Remediation of ARA-02 septic system, and (3) Remediation of ARA-16 radioactive waste system and soils at ARA-25 beneath the ARA-626 Hot Cells.

B-1.2.1 Septic Systems at ARA-07, ARA-08, ARA-13, and ARA-21

Remediation activities at ARA-07, ARA-08, ARA-13, and ARA-21 will involve the excavation or exposure of the top of the septic tanks and a chlorination tank, the excavation and removal of the piping, and backfill of the seepage and pit. These septic systems served as sanitary waste systems at ARA-I/II, ARA-III, and ARA-IV.

ARA-07 consists of a seepage pit with an asphalt roof. The roof will be removed and the leach pit walls excavated approximately two feet below land surface and the pit backfilled with clean soil. ARA-07 is located in a soil contamination area.

The ARA-08 work involves the removal of an estimated 3 feet of soil to expose the top of the seepage pit. The concrete tank cover will be removed and the inside of the tank backfilled with clean soil. ARA-08 is located in a soil contamination area.

The ARA-13 system is a 3,000-gallon sanitary sewer septic tank and the associated leach field. The covers will be removed and if liquid is present, a sample will be collected for analysis. If the tank is determined to be noncontaminated or does not contain liquid, it will be left in place and backfilled. If the

system is contaminated, the tank, manhole, distribution box, and interconnected piping will be excavated and dispositioned, based upon waste determination from the sample results. If the tank is not contaminated, it will be backfilled and left in place.

ARA-21 consists of a 1,000-gallon, precast concrete septic tank, a 250-gallon, precast concrete chlorine contact tank, approximately 75 feet of 4-inch sewer line, and a seepage pit. The septic tank and chlorination tank will be opened, and a sample from any liquids will be collected for analysis. If the tanks are contaminated, they will be excavated and dispositioned based upon waste determination from the sample results. If the tanks are not contaminated, they will be left in place and backfilled. It is not anticipated that the tanks are contaminated. An estimated 4.5 feet of soil will be uncovered and backfilled at the seepage pit.

B-1.2.2 ARA-02 Septic System

The ARA-02 site is a sanitary septic system comprising three septic tanks in series, three manholes, a seepage pit, and the associated piping. The system was built in 1960 and serviced permanent and temporary ARA-I buildings until 1988 when ARA-I was inactivated. The ARA-02 septic system was designed and intended exclusively for sanitary waste. No known process waste was routed to the system, and no recorded spills or documented incidents were associated with the septic system. However, periodic surveys indicated radiological contamination. The source of the contamination is unknown.

The ARA-02 Sanitary Waste System will be remediated to mitigate excess human health risk. External exposure to radioactive contaminants is the primary exposure of concern. The entire system (i.e., three septic tanks, three manholes, a seepage pit, and piping) will be removed. However, the unacceptable risk is associated only with contaminants in residual dry sludge at the bottom of the seepage pit. Residual sludge in the seepage pit is the only waste present. The sludge is identified as mixed waste containing low levels of radionuclides and low concentrations of toxic metals and organics. The remediation of the Sanitary Waste System will include the following activities:

- The sludge in the seepage pit will be removed and sent for storage or treatment at a facility approved by Waste Generator Services (WGS).

- The components of the Sanitary Waste System (i.e., the seepage pit gravel and cinder blocks, three manholes, three septic tanks, and pipes) will be excavated. The debris will be sent to a permitted disposal facility off the INEEL such as Envirocare in Clive, Utah, or an approved facility on the INEEL such as the INEEL CERCLA Disposal Facility (ICDF) for final disposal. The debris will be decontaminated or encapsulated, only if necessary, to meet waste acceptance criteria for disposal.

- The excavated areas will be backfilled, contoured to match the surrounding terrain, and vegetated.

- Based on soil sampling results, soil contaminated with concentrations in excess of remediation goals is not expected. However, if such soil is identified by observation or using field survey equipment during remediation of the Sanitary Waste System, the soil will be removed and disposed of at a facility off the INEEL, such as Envirocare or an approved facility on the INEEL.

- Existing institutional controls will be maintained until the selected remedy has been implemented. Institutional controls will not be required after remediation if all

contaminated media are removed to basalt or if contaminant concentrations are comparable to local background values. Otherwise, postremediation institutional controls consisting of signs, access controls, and land-use restrictions will be established and maintained until discontinued (time based on the results of a 5-year review).

B-1.2.3 ARA-16 Radioactive Waste System Scope of Work

The ARA-16 site is a 3,785-L (1,000-gal) stainless steel underground holding tank resting within a lidless concrete vault and covered by approximately 1.1 m (3.5 ft) of soil. From 1959 to 1988, the tank received radioactive liquid waste, including wash water from the ARA-I hot cells, and methanol, acetone, chlorinated paraffin, and mixed acids from materials testing and research and metal-etching processes. Periodically, the contents of the tank were emptied into a tank truck and transported to the Idaho Nuclear Technology and Engineering Center (INTEC) (known as the Idaho Chemical Processing Plant at that time) for disposal. The ARA-I facility was formally shut down in 1988 and the tank was partially excavated. All lines into and out of the tank were cut and capped, and the contents were agitated and pumped out, leaving a small amount of residual liquid and sludge in the tank. Soil from the excavation was replaced over the tank.

Waste in the underground storage tank is classified as mixed waste that contains radionuclides, toxic metals, and organic compounds. The selected remedy for the ARA-16 site is removal of the ARA-16 Radionuclide Tank vault, gravel, associated piping, and contained waste, and shipment for ex situ thermal treatment and disposal.

The ARA-16 tank contains approximately 17 L (4.5 gal) of sludge and 1,180 L (312 gal) of liquid waste (Coveleskie 1999). The waste contains high concentrations of radionuclides, toxic metals, and organics, including polychlorinated biphenyls (PCBs). Based on sampling results and process knowledge, the waste is considered low-level radioactive mixed waste and Resource Conservation and Recovery Act (RCRA)-listed waste. The associated RCRA waste codes are F001 because of concentrations of trichloroethylene, methylene chloride, and 1,1,1-trichloroethane, and F005 because of concentrations of toluene. In addition, the waste is classified as RCRA characteristic waste for trichloroethylene. Aroclor-1260 was detected at 98 parts per million (ppm) in the sludge; hence, the waste is also regulated under the Toxic Substance Control Act (TSCA).

The waste sludge and liquid will be removed from the tank, placed in approved containers, and transported to an approved storage or treatment facility per WGS.

Excavation and removal of the structural components of the tank system will require use of conventional excavation equipment such as backhoes and front-end loaders as well as hand digging. During excavation, real-time gamma surveys will be used to delineate the extent of contamination and allow segregation of contaminated soil from uncontaminated soil. The contaminated soil will be disposed of at an approved facility. Uncontaminated soil will be returned to the excavation site.

Following removal of the ARA-16 tank system, the excavated site will be backfilled with uncontaminated soil, compacted, and vegetated in accordance with INEEL guidelines (DOE-ID 1989).

B-1.2.4 ARA-25: ARA-I Soil Beneath the ARA-626 Hot Cells

The ARA-25 site comprises contaminated soil that was discovered beneath the ARA-626 hot cells during the decontamination and dismantlement (D&D) of the ARA-I facility in 1998. This soil remediation will be performed in conjunction with the ARA-16 radionuclide tank work. The contamination was found near the hot cell floor drains. The contaminated area immediately around the

drains measures approximately 2.4 × 3.7 m (8 × 12 ft). However, other isolated hot spots beneath the building were also discovered. Therefore, a cumulative size of 4.9 × 7.3 m (16 × 24 ft) was estimated for the site.

The ARA-I hot cells were constructed in 1959 and used until the facility was shut down in 1988. In addition to liquid radioactive waste, such as wash water from the ARA-I hot cells, chemicals from materials testing and research and metal-etching processes were used at the facility. Stainless steel piping connected the floor drains to the ARA-729 Radionuclide Tank (Site ARA-16), which contains PCB-contaminated, RCRA F-listed mixed waste (40 CFR 261, Subpart D), and transuranic radionuclides. The pipes are included in the remediation of Site ARA-16 and are not a component of the ARA-25 site.

Remedial action is required for the ARA-25 Soil Beneath the ARA-626 Hot Cells to address the risk to human and ecological receptors posed by contaminated soil. The analytical results showed concentrations of arsenic, lead, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Ra-226, and Sr-90 in excess of human health screening levels in the soil.

B-2 KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. The names of the individuals in key roles at the site and lines of responsibility and communications are shown in the project organizational chart (Figure B-2.1). Descriptions and responsibilities of the key site personnel are detailed in Section 2 of this HASP.

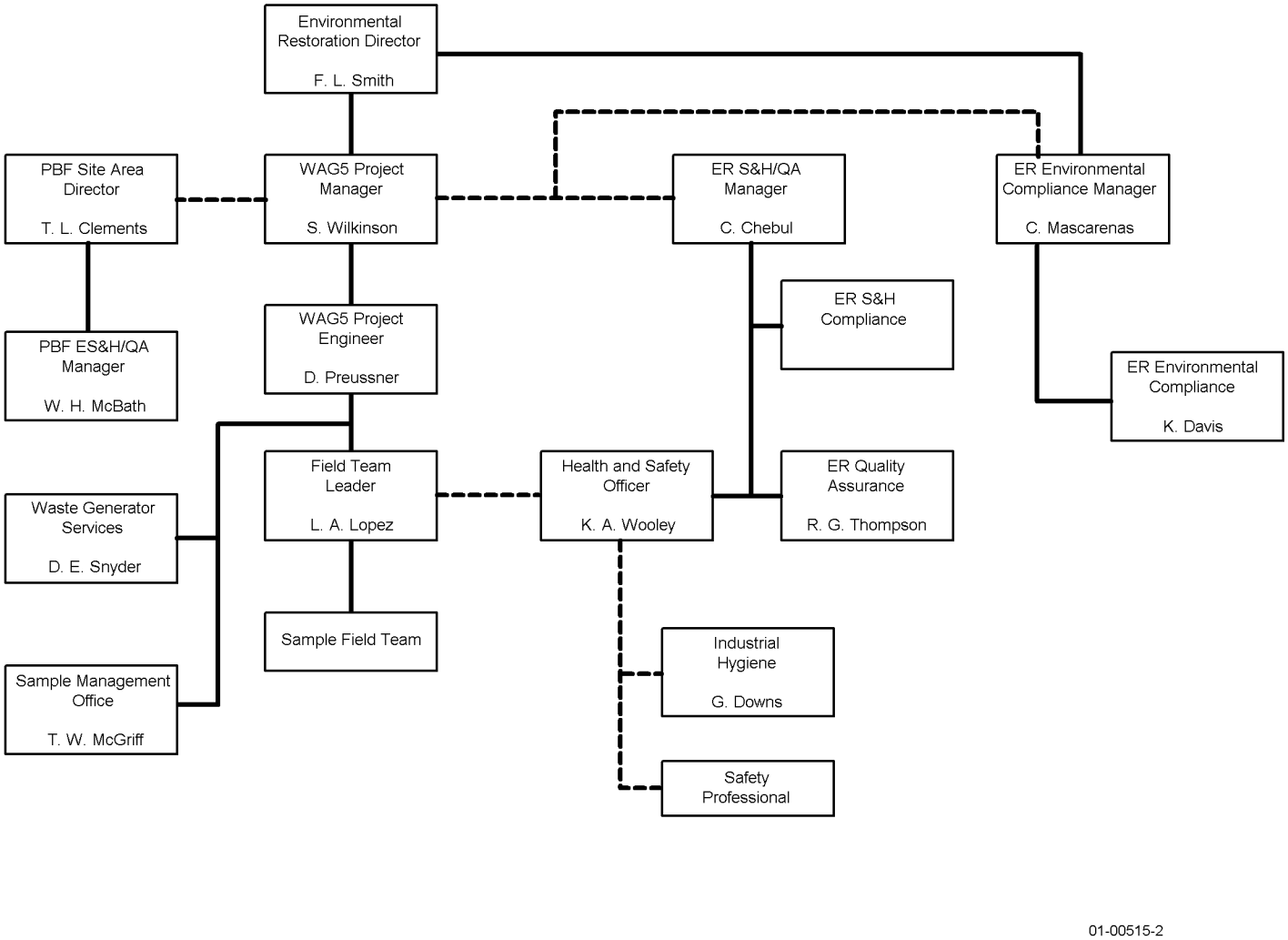

Figure B-2-1. Field Organization Chart for OU 5-12 RD/RA Tank System Remediation Projects.

B-3. RECORDKEEPING REQUIREMENTS

There are no site-specific changes for recordkeeping requirements. Refer to Section 3 of this HASP for requirements regarding recordkeeping for this project.

B-4. PERSONNEL TRAINING

All site personnel will receive training as specified in Section 4 and Table 4-1 of this HASP as a minimum. Before beginning work at the site, site-specific training will be conducted by the Field Team Leader (FTL) or Health and Safety Officer (HSO) including a complete review of this HASP and this appendix. This review will include time for discussion and questions. Upon completing site-specific training, personnel will sign the training acknowledgement form indicating that they have received this training, understand the tasks and associated hazards, and agree to follow all HASP and other safety requirement documents. The FTL will be responsible for verifying all personnel working at the site have completed the training specified in Table 4-1 prior to permitting personnel to enter the work site.

B-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based upon the existing site-specific sampling information available for this project, there are no additional Occupational Medical Surveillance Program requirements. Refer to Section 5 of this HASP for information regarding the INEEL Occupational Medical Surveillance Program requirements.

B-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed under approved work order documentation written and authorized per the requirements of Standard (STD)-101. Refer to Section 6 of this HASP for information regarding the Accident Prevention Program requirements.

B-7. SITE CONTROL AND SECURITY

Refer to Section 7 for definitions and descriptions of the various work zones and areas used to control site access and work tasks. The FTL and HSO will be responsible for working with the Industrial Hygienist (IH), Safety Engineer (SE), and Radiological Control Technician (RCT) to establish the site boundaries. As a minimum, the site control zones will consist of an Exclusion Zone established around the excavation and soil disturbance areas. A Contamination Reduction Zone/Contamination Reduction Corridor (CRZ/CRC) will be established around the entire Exclusion Zone. A Support Zone will be established outside of the CRZ/CRC to provide a clean area for materials staging and administrative activities. Radiological Zones will be established per RadCon evaluation and will be arranged to correspond with the site control zones. The work zones and radiological zones will be continually evaluated by the FTL and HSO and adjusted as needed upon consultation with the RCT, IH, and SE. Figure B-7.1 provides a general map for establishing the zones.

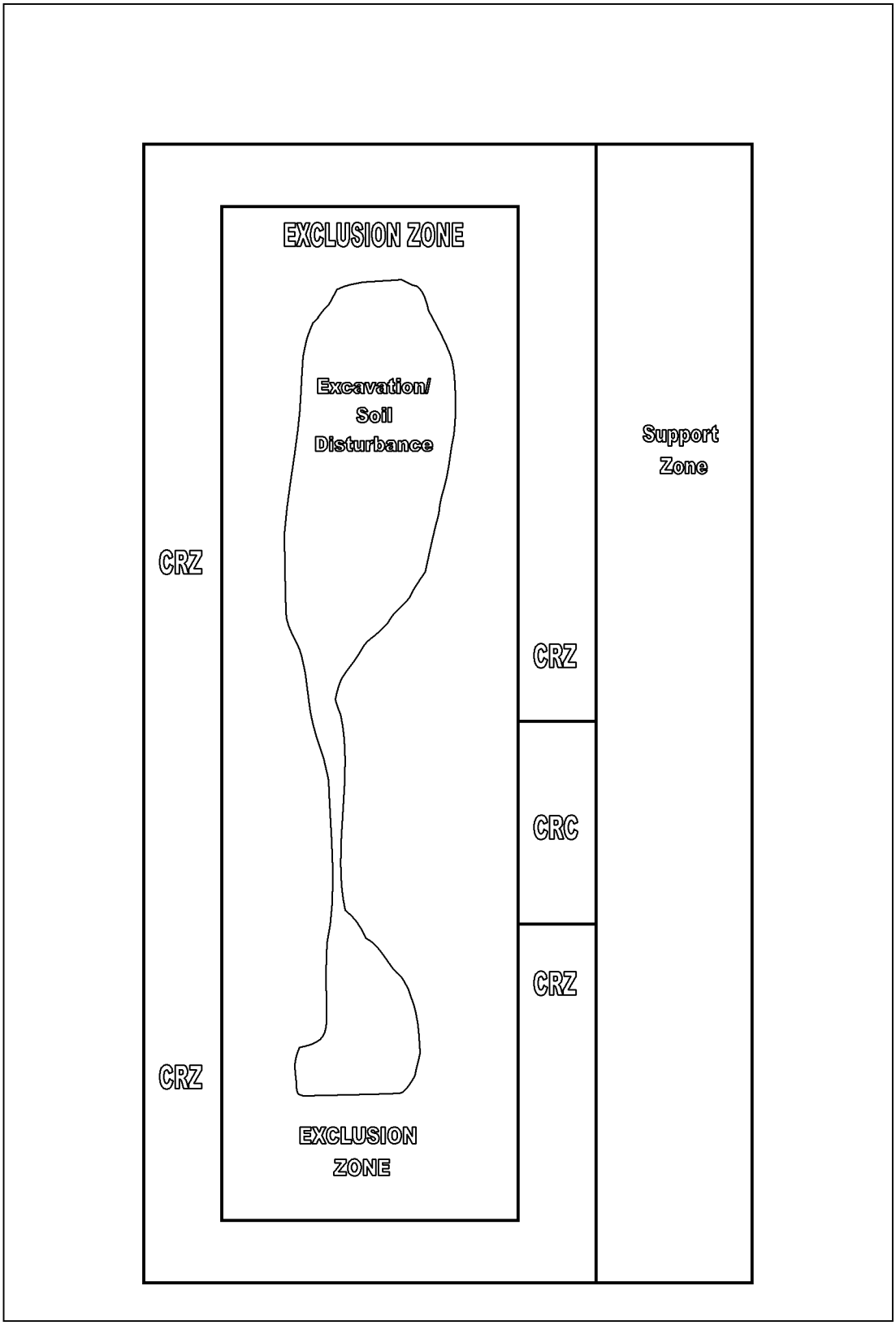

Figure B-7.1. Example of site control zones.

B-8. HAZARD ASSESSMENT

Section 8 of this HASP provides general information regarding the types of hazards that may be encountered while performing OU 5-12 RD/RA work. Specific hazards associated with the Tank System Remediation Projects, as identified on the Hazard Identification and Mitigation Checklist per STD-101 and the Hazards Identification and Mitigation process, are presented in this section.

The general hazards identified for the remediation activities at the ARA-07, ARA-08, ARA-13, ARA-21, ARA-02, ARA-16, and ARA-25 are based on the Hazard Identification and Mitigation Checklist for the activities and are summarized in Table B-8.1.

Table B-8.1. Activities and Associated Hazards at ARA-07, ARA-08, ARA-13, ARA-21, ARA-02, ARA-16, and ARA-25

Activity or Task	Associated Hazards or Hazardous Agent
Mobilization	Equipment movement
	Heat/cold stress
	Manual material handling
	Radiological exposure
	Slip/trip hazards due to walking/working surface
Performance of Work	Radiological exposure
	Chemical/inorganic contaminants/dust exposure
	Equipment movement
	Hoisting and rigging
	Repetitive motion
	Manual material handling
	Fuels/flammable liquids
	Slip/trip hazards due to unstable working surfaces
	Noise
	Confined space
	Fall hazards
	Excavation/surface penetration
	Biological hazards
	Heat/cold stress
Demobilization	Equipment movement
	Slip/trip hazards due to walking surfaces
	Heat /Cold Stress
	Manual materials handling
	Radiological Exposure

Each of these hazards is discussed in Section 8 of this HASP. The FTL and HSO will ensure all personnel are provided site-specific training per Section 4 of this HASP that includes each of these hazards and the mitigation in Section 8 prior to permitting personnel to work at these sites.

Personnel will be potentially exposed to chemical and radiological agents while working at the OU 5-10 RD/RA Tank System Remediation project sites. The magnitude of these hazards to personnel entering the work zones is dependent on both the chemical/radiological nature of the contaminants encountered and the intrusive tasks being performed. Table B-8.2 lists the radiological and nonradiological contaminants, route of exposure, symptoms of overexposure, and overexposure potential.

Table B-8.2. Radiological and nonradiological contaminants of concern.

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16/ARA-02	Ag-108m	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	Am-241	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02 ARA-25	Co-60	Inh	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02 ARA-25	Cs-134	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02 ARA-25	Cs-137	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02 ARA-25	Eu-152	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02 ARA-25	Eu-154	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-02	Np-237	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16	Zn-65	Inh, Ing, external exposure	NA /Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	Pu-238	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-02	Ra-226	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	Pu-239/240	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	U-234	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	U-235	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	U-238	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16/ARA-02	Am-241	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low

Table B-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16/ARA-02 ARA-25	Sr-90	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-02	Tc-99	nh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-16	Tritium	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-25	Ra-226	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-02	Th-230	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-02/ARA-16	Polychlorinated Biphenyl	Inh, Abs, Ing, Con	Irritate eyes, chloracme/skin, eyes, liver	Low
ARA-16	1,1-Dichloroethene	Inh, Ing	Anesthesia, dermatitis, Central Nervous System (CNS) depression, liver/kidney damage	Low
ARA-16	1,1-Dichloroethane	Inh, Ing, Abs	CNS depression, skin irritation, liver/kidney damage	Low
ARA-02	Diethyl ether	Inh, Ing, Con	Dizziness, drowsiness, nausea, vomiting, skin irritation, CNS, eyes, respiratory system	Low
ARA-16	1,1,2,2-Tetrachloroethane	Inh, Abs, Ing, Con	Nausea, vomiting, abdominal pain, tremor fingers, jaundice, enlarged liver, dermatitis, monocy, kidney damage	Low
ARA-16	1,1,1-Trichloroethane	Inh, Ing, Con	CNS depression, poor equilibrium, irritated eyes, dermatitis, irregular heart beat	Low
ARA-16	Trichloroethene	Inh, Abs, Ing, Con	Irritated nose and eyes, CNS depression, liver/kidney damage	Low
ARA-16	Toluene	Inh, Abs, Ing, Con	Fatigue, euphoria, dizziness, dilated pupils, muscle fatigue, insomnia, dermatitis	Low
ARA-16	1,1,2-Trichloroethane	Inh, Abs, Ing, Con	Irritated nose and eyes, CNS depression, liver/kidney damage	Low

Table B-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16	Tetrachloroethylene	Inh, Ing, Con	Irritated eyes, nose, throat; nausea, flush face, neck, vertigo, dizziness, liver damage	Low
ARA-16	Ethylbenzene	Inh, Ing, Con	Irritated eyes and mucous membrane, dermatitis, narcolepsy, coma	Low
ARA-16	O, M, and P-xylenes	Inh, Abs, Ing, Con	Dizziness, incoherence, loss of balance, eye/respiratory irritation, nausea, vomiting, abdominal pain, CNS, eyes, blood, liver, kidneys	Low
ARA-16	Antimony	Inh, Con	Irritate nose/throat/mouth, cough, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, insomnia, irritated skin, unable to smell properly, cardiac abnormalities, respiratory system, cardiovascular system, skin and eyes	Low
ARA-16/ARA-02 ARA-25	Arsenic	Inh, Abs, Con, Ing	Ulceration of nasal septum, gastrointestinal (GI) disturbances, dermatitis, respiratory irritation, hyperpigmentation of skin/ liver, kidneys, skin, lungs, lymphatic system	Low
ARA-16	Barium	Inh, Ing, Con	Respiratory irritation, gastroenteritis, muscle spasm, slow pulse, hypokalemia, eye irritation, skin irritation/burns, blood, CNS, skin, respiratory system, eyes	Low
ARA-16	Beryllium	Inh	Respiratory symptoms, weakness, fatigue, weight loss/lungs, skin, eyes, mucous membrane	Low
ARA-16/ARA-02	Cadmium	Inh, Ing	Pulmonary edema, cough, chest tightness, headache, chills, muscular aches, nausea, vomiting, diarrhea, mild anemia/respiratory system, kidneys, prostate, blood	Low

Table B-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16ARA-02	Chromium	Inh, Ing	Eye irritation, cough, pulmonary edema, nausea, vomiting, skin irritation	Low
ARA-16	Cobalt	Inh, Ing, Con	Cough, decreased pulmonary function, low weight, dermatitis, diffuse nodular fibrosis, respiratory system, skin	Low
ARA-16/ARA-02	Copper	Inh, Ing, Con	Irritated mucous membrane, nasal perforation, eye irritation, metallic taste, dermatitis, respiratory system, skin, liver, kidneys	Low
ARA-16	Iron	Inh	Pneumoconiosis, respiratory system	Low
ARA-16/ARA-02 ARA-25	Lead	Inh, Ing, Con	Weakness, insomnia, facial pallor, anorexia, low weight, constipation, abdominal pain, colic, anemia, tremors, encephalopathy, nephropathy, irritated eyes, hypotension, GI tract, CNS, kidneys, blood	Low
ARA-16	Manganese	Inh, Ing	Parkinson's disease, asthenia, insomnia, mental confusion, metal fume fever, dry throat, cough, tight chest, low back pain, fatigue, respiratory system, CNS, blood, kidneys	Low
ARA-16	Mercury	Inh, abs, ing, con	Ataxia, dysarthria, vision/hearing, spastic/jerky movements, dizziness, salivating, nausea, vomiting, diarrhea, constipation, skin burns, emotional distress/CNS, kidneys, eyes, skin	Low
ARA-16/ARA-02	Nickel	Inh, Ing, Con	Vertigo, abdominal pain, nausea, vomiting, sternal pain, cough, weakness, oneumitis, delirium, convulsions/lungs, sinus, CNS	Low

Table B-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16	Selenium	Inh, Abs, ing, Con	Irritated eyes/nose/throat, visual disturbances, headache, chills, fever, bronchitis, metallic taste, garlic breath, GI irritation, dermatitis, eye burns, skin burns, respiratory system, eyes, skin, liver, kidneys, blood	Low
ARA-16/ARA-02	Silver	Inh, ing, Con	Blue/gray eyes, nasal/septum/throat/skin irritation, skin ulceration, GI irritation/nasal septum, skin, eyes	Low
ARA-16	Thallium	Inh, Ing, Abs, Con	Nausea, diarrhea, abdominal pain, vomiting, ptosis, strabismus, tremors, chest pain, pulmonary edema, chorea, psychosis, liver/kidney damage, eyes, CNS, lungs, kidneys, liver, GI, hair	Low
ARA-16	Fluoride	Inh, Ing, Con	Eye and respiratory irritation, nausea, diarrhea, thirst, sweating, stiffness, eyes, respiratory system, CNS, bones, kidneys, skin	Low
ARA-16	Chloride	Inh, Con	Burning eyes, nose, mouth, and throat, choking, coughing, nausea, vomiting, dizziness, pulmonary edema, pneumonia, respiratory system	Low
ARA-16	Bromide	Inh, Ing, Cont	Dizziness, headache, depression, pulmonary edema, abdominal pain, acne, skin/eye burns, respiratory system, eyes/CNS	Low
ARA-16	Phosphate	Inh, Ing, Con	Irritated eyes, respiratory tract, abdominal pain, nausea, anemia, mouth pain, salivation, jaw pain, skin and eye burns, respiratory system, liver, kidneys, teeth, blood	Low

Table B-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-16	Calcium	Inh, Ing	Irritated eyes, respiratory system, ulcers, nasal, pneumonia, respiratory system, eyes, skin	Low
ARA-16	Magnesium	Inh, Con	Irritated eyes, nose, metal fume fever, cough, chest pain, respiratory system, eyes	Low
ARA-16	Zinc	Inh, Ing	Metallic taste, dry throat, cough, chills, tight chest, blurred vision, muscle cramps, nausea, vomiting, respiratory system	Low

Engineering and administrative controls will be implemented, whenever possible, along with adequate work practices, real-time monitoring of contaminants, and site-specific hazard training to further mitigate potential exposures and hazards. Table B-8.3 lists monitoring equipment for the radiological and nonradiological hazards.

B-9. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) requirements for the OU 5-12 RD/RA Tank System Remediation Projects are provided in Table B-9.1. Refer to Section 9 of this HASP for additional descriptions and requirements on PPE.

B-10. DECONTAMINATION PROCEDURES

Every effort will be made to prevent the contamination of personnel and equipment through the use of engineering controls, good work practices, and personal protective equipment. The IH and RadCon will specify PPE requirements to prevent personnel contamination as well as specifying the sampling methods and decontamination process used. As determined necessary, the ARA-16 tank and associated piping will be decontaminated in accordance with TSCA and RCRA decontaminating standards and procedures to the extent possible. Sampling will be performed to determine whether the RCRA clean debris standard is met. Because the tank and pipes are stainless steel, it is assumed that these materials can be cleaned to meet criteria for disposal as non-RCRA regulated, low-level radioactive debris at the Radioactive Waste Management Complex (RWMC), the INEEL CERCLA Disposal Facility (ICDF), or other disposal facility on the INEEL. Encapsulation of the tank and pipes will be performed only if required to meet the waste acceptance criteria of the disposal facility. The decontamination residue will be treated at the Waste Experimental Reduction Facility (WERF), and the residuals will be disposed of at a permitted disposal facility off the INEEL. For information describing contamination control and prevention and emergency decontamination procedures, refer to Section 10 of this HASP.

B-11. EMERGENCY RESPONSE PLAN

The FTL and HSO will be responsible to ensure Section 11 of this HASP is implemented prior to commencement of this project. This includes ensuring proper facility and emergency organization notifications are made prior to field mobilization. The following project-specific emergency response equipment will be available on site per Table B-11.1.

Table B-8.3. Monitoring equipment for radiological and nonradiological hazards.

Monitored or Sampled Hazard	Monitoring/Sampling Equipment Method
Radionuclides (beta-gamma)	Ludlum 2A or equivalent
Radionuclides (alpha)	Ludlum 61 or equivalent
VOCs	PID or detector tubes
Noise	Sound level meter and/or noise dosimeters
Heat/Cold Stress	Heat Stress – WBGT, body wt, fluid intake
	Cold Stress – ambient air temperature, wind chill charts

Air sampling will be conducted, as deemed appropriate, by the project IH and RCT based upon initial direct-reading instrument data, swipes, and other site factors.

VOC = volatile organic compound

WBGT = Wet Bulb Globe Temperature

PID = Photoionization Detector

Table B-9.1. PPE requirements for OU 5-12 RD/RA Tank System remediation projects.

Task or Assignment	Level of PPE	Modifications and Comments
1. Project Mobilization at all locations	Level D	All mobilization tasks in the support zone (SZ) will be conducted in Level D PPE meeting the minimum Environmental Restoration (ER) field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	Modified Level D	Modification will be per the task Safe Work Permit (SWP) for chemical concerns in the Exclusion Zone as determined by the IH and the Radiological Work Permit (RWP) for radiological concerns per RadCon.
2. Performing Field Work	Modified Level D(ARA-07, ARA-08, ARA-13, ARA-21)	Modified Level D (protective clothing) per the task SWP for chemical concerns in the Exclusion Zone as determined by the IH and the RWP for radiological concerns per RadCon.
	Modified Level D upgraded to Level C (ARA-02 and ARA-16)	Modified Level D with upgrade to Level C per RadCon and/or IH direction on RWP/SWP.
3. Demobilization	Level D	All demobilization tasks in the SZ will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	Modified Level D	Modification will be per the task SWP for chemical concerns in contamination reduction zone/exclusion zone as determined by the IH and the RWP for radiological concerns per RadCon.

Table B-11.1. PBF-16 emergency response equipment.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers	Support zone, project vehicle	HSO	Monthly
First aid supplies	Support zone	HSO	Weekly
Eyewash station	Support zone	HSO	Monthly
Hazardous materials spill kit	Project vehicle	FTL	Monthly
Communication Equipment	FTL or project vehicle	FTL	Daily

a. Consult the assigned safety and fire protection engineers to determine appropriate type and quantity of fire extinguisher(s).

Refer to Section 11 of this HASP for the emergency contacts and notification requirements. The FTL will ensure all personnel are aware of emergency information contained in Section 11 of this HASP during the project-specific HASP training.

Appendix C

OU 5-12 RD/RA Contaminated Soil Sites Remediation Project

Appendix C

OU 5-12 RD/RA Contaminated Soil Remediation Projects

C-1. INTRODUCTION

This Operable Unit (OU) 5-12 Remedial Design/Remedial Action (RD/RA) Health and Safety Plan (HASP) appendix establishes the procedures and requirements that will be used to eliminate and/or minimize health and safety risks to personnel working on the Contaminated Soil Remediation Projects. For information on the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of this HASP.

C-1.1 INEEL Site Description

For details on the location and operational history of the Idaho National Engineering and Environmental Laboratory (INEEL) and the Power Burst Facility/Auxiliary Reactor Area (PBF/ARA), see Section 1 and Figures 1-1 and 1-2 of this HASP.

C-1.2 Scope of Work

The Contaminated Soil Projects remedial action addresses the risk associated with a collection of five individual sites where contaminated soil is the only source medium (ARA-01, ARA-12, ARA-23, and PBF-16). The soil sites are contaminated with radionuclides and toxic metals. Unacceptable risk to human health or the environment from contaminated soil sites designated as ARA-01, ARA-12, ARA-23, and PBF-16 have been identified. The human health risk associated with ARA-01, ARA-12, and ARA-23 is primarily external exposure to ionizing radiation. Adverse effects to ecological receptors are associated with ARA-01, ARA-12, and PBF-16. Removing all soil that is contaminated with concentrations in excess of the remediation goals will mitigate these threats. The remediation of the soil sites will include the following activities:

- Soil contaminated with concentrations in excess of the remediation goals will be removed using conventional earth-moving equipment (e.g., scrapers and backhoes).
- Areas that have been excavated to depths greater than 0.3 m (1 ft) will be backfilled with clean soil or sloped to promote drainage. All excavations will be contoured to match the surrounding terrain and vegetated.
- Contaminated soil will be characterized and sent to the INEEL CERCLA Disposal Facility (ICDF) or another location within the INEEL for permanent disposal.
- Existing institutional controls will be maintained until the selected remedy has been implemented at four of the five contaminated soil sites. Interim controls are not required for PBF-16, a site identified for remediation based on ecological risk from exposure to mercury. Institutional controls will not be required after remediation if all contaminated

media are removed to basalt or if contaminant concentrations are comparable to local background values. Otherwise, postremediation institutional controls consisting of signs, access controls, and land-use restrictions will be established and maintained until discontinued based on the results of a 5-year review.

C-1.2.1 ARA-01: ARA-1 Chemical Evaporation Pond

The ARA-01 site is a shallow, unlined surface impoundment, roughly 30 × 90 m (100 × 300 ft) in size, which was used to dispose of laboratory wastewater from the ARA-I Shop and Maintenance Building (ARA-627). Located southeast of ARA-I, the pond was constructed in 1970 by excavating soil to create a shallow topographic depression. Basalt outcrops are present within and immediately adjacent to the pond. The subsurface immediately beneath the pond consists of fracture and rubble zones. No interbed was found within the first 36 m (118 ft).

From 1970 to 1988, the pond received process discharges that contained small quantities of radioactive substances, acids, bases, and volatile organic compounds. Since 1988, the pond has been dry except during spring runoff and heavy precipitation.

The ARA-01 Chemical Evaporation Pond will be remediated to address the risk to human and ecological receptors posed by contaminated soil. Samples collected in 1997 yielded concentrations of Am-241, Cs-137, Sr-90, U-235, Pu-238, Pu-239/-240, Ra-226, arsenic, lead, and thallium in excess of contaminant screening levels for human health.

C-1.2.2 ARA-12: ARA III Radioactive Waste Leach Pond

The ARA-12 site is an unlined surface impoundment with approximate dimensions of 115 × 50 m (370 × 150 ft). The pond was constructed in a natural depression west of ARA-III to dispose of low-level liquid waste from reactor research operations. Liquid waste was stored temporarily in tanks, then transferred to the leach pond via an underground pipe. Effluent contained low-level radioactive material. A second, separate discharge line originated in an uncontaminated water storage tank. The pond also received facility runoff through a culvert. The ARA-III facility was an active reactor research facility from about 1959 to 1965. From 1966 to 1987, activities at ARA-III were limited to component and instrumentation testing, instrumentation development and fabrication, and chemical research. Waste associated with these activities was not disposed of in the leach pond, and the only discharges to the pond during this period were from the water storage tank and facility runoff. The facility was shut down in 1987, leaving the pond dry except during spring runoff and heavy precipitation. In 1991, the culvert was plugged in preparation for decontamination and dismantlement (D&D) operations at ARA-III, and in 1993, the tanks and waste lines to the leach pond were removed.

Remedial action is required for the ARA-12 Radioactive Waste Leach Pond to address the risk to human and ecological receptors posed by contaminated soil. The ARA-12 site contaminants of concern for human health risks are from chromium, lead, manganese, Ag-108m, Am-241, Co-60, Cs-137, Pu-238, U-234, and U-238.

C-1.2.3 ARA-23: Radiologically Contaminated Soils at ARA-I and ARA-II

The ARA-23 site is a 17-ha (42-acre) windblown contamination area surrounding ARA-I and ARA-II. The site also contains subsurface structures remaining after D&D within the ARA-I and ARA-II facilities. The 1961 SL-1 accident and subsequent cleanup radiologically contaminated the soil. Minor amounts of contamination may have been added by other ARA operations. Over time, winds dispersed

the contamination over an area roughly 100 hectares (240 acres) in size, but soil concentrations over most of the area are significantly less than risk-based remediation goals. The long axis of the roughly oval-shaped site is consistent with the generally southwest-to-southeast winds common at the INEEL.

Remedial action is required for the ARA-23 radiologically contaminated soils to address the risk to human health posed by contaminated soil. The ARA-23 site was retained for quantitative risk assessment in the comprehensive Baseline Risk Assessment (BRA) to evaluate the human health risk potential from Am-241, Cs-137, Ra-226, Sr-90, Th-230, and U-235 detected in the soil. The site was also retained for qualitative risk evaluation of Cs-137 data obtained with the global positioning radiometric scanner (GPRS). Because ARA-23 encompasses the ARA-I and ARA-II facilities and the SL-1 Burial Ground, 15 other sites (i.e., ARA-01, -02, -03, -04, -05, -06, -07, -08, -09, -10, -11, -16, -17, -19, and -25) fall within the boundaries of the windblown contamination area as originally defined. Several of these sites were retained for quantitative analysis in the Remedial Investigation/Baseline Risk Assessment (RI/BRA) (Holdren et al. 1999). Others were eliminated from further evaluation. However, residual soil contamination at these 15 sites was probably generated by the same sources as the ARA-23 contamination. Therefore, all residual soil contamination in ARA-23 not specifically addressed for another individual site will be addressed as part of the RD/RA with ARA-23.

C-1.2.5 PBF-16: SPERT-II Leach Pond

Remedial action is required for the PBF-16 Special Power Excursion Reactor Test (SPERT)-II Leach Pond to address the risk to ecological receptors posed by contaminated soil. Site investigations, the nature and extent of contamination, and a summary of site risks are presented below. More detailed information about the pond can be found in the Waste Area Group (WAG) 5 Comprehensive Remedial Investigation/Feasibility Study (RI/FS) report (Holdren et al. 1999).

The PBF-16 site is a fenced, unlined surface impoundment, with approximate dimensions of 70 × 51 m (230 × 167 ft), located south of the SPERT-II Reactor Building. From 1959 to 1964, the leach pond was used for disposal of demineralizer effluent, water softener waste, emergency shower drain water, and discharges from the floor drains from the reactor building. From 1964 until 1990, the only discharge to the pond was clean water from the PBF maintenance shop air compressor (Hillman-Mason et al. 1994). The compressor was removed in 1994 and no water has been discharged to the SPERT-II Leach Pond for several years (Gerber 1999).

The SPERT-II Leach Pond was screened from evaluation in the human health risk assessment (Holdren et al. 1999). Mercury was detected at 0.71 mg/kg and eliminated from evaluation based on comparison to the risk-based soil concentration of 23 mg/kg (Environmental Protection Agency [EPA] 1995). Though lead was detected at 32 mg/kg, risk could not be quantified because toxicity data for lead have not been developed. However, the maximum detected lead concentration is considerably less than the EPA 400-mg/kg screening level (EPA 1994). Therefore, lead was not identified as a contaminant of concern (COC) based on human health risk.

Mercury was identified as a COC for PBF-16 based on the results of the Ecological Risk Assessment (ERA) (Holdren et al. 1999). The hazard quotients (HQs) for mercury range up to 50 for mammalian insectivores at PBF-16. Avian and mammalian herbivores have hazard quotients (HQs) that exceed 1.0 including an HQ of 10 for the pygmy rabbit. Because HQs that exceed 10 are associated with the site, remediation will be implemented to protect ecological receptors.

C-2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. The names of the individuals in key roles at the site, and lines of responsibility and communications are shown in the project organizational chart (Figure C-2.1). Descriptions and responsibilities of the key site personnel are detailed in Section 2 of this HASP.

C-3. RECORD KEEPING REQUIREMENTS

There are no site-specific changes for record keeping requirements. Refer to Section 3 of this HASP for requirements regarding record keeping for this project.

C-4. PERSONNEL TRAINING

All site personnel will receive training as specified in Section 4 and Table 4-1 of this HASP as a minimum. Before beginning work at the site, site-specific training will be conducted, including a complete review of this HASP and this appendix. This review will include time for discussion and questions. Upon completing site-specific training, personnel will sign the training acknowledgement form indicating that they have received this training, understand the tasks and associated hazards, and agree to follow all HASP and other safety requirement documents. The Field Team Leader (FTL) will be responsible for verifying all personnel working at the site have completed the training specified in Table 4-1 prior to permitting personnel to enter the work site.

C-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based upon the existing site-specific sampling information available for this project, there are no additional Occupational Medical Surveillance Program requirements. Refer to Section 5 of this HASP for information regarding the INEEL Occupational Medical Surveillance Program requirements.

C-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed under approved work order documentation written and authorized per the requirements of Standard (STD)-101. Refer to Section 6 of this HASP for information regarding the Accident Prevention Program requirements.

C-7. SITE CONTROL AND SECURITY

Refer to Section 7 for definitions and descriptions of the various work zones and areas used to control site access and work tasks. The Health and Safety Officer (HSO) will be responsible for working with the Industrial Hygienist (IH), Safety Engineer (SE), and Radiological Control Technician (RCT) to establish the site boundaries. As a minimum, the site control zones will consist of an Exclusion Zone established around the soil disturbance areas. A Contamination Reduction Zone/Contamination Reduction Corridor (CRZ/CRC) will be established around the entire Exclusion Zone. A Support Zone will be established outside of the CRZ/CRC to provide a clean area for materials staging and administrative activities. Radiological Zones will be established per the RadCon evaluation and will be arranged to correspond with the site control zones. The work zones and radiological zones will be continually evaluated by the FTL and HSO and adjusted, as needed, upon consultation with the RCT, IH, and SE. Figure C-7.1 provides a general map for establishing the zones.

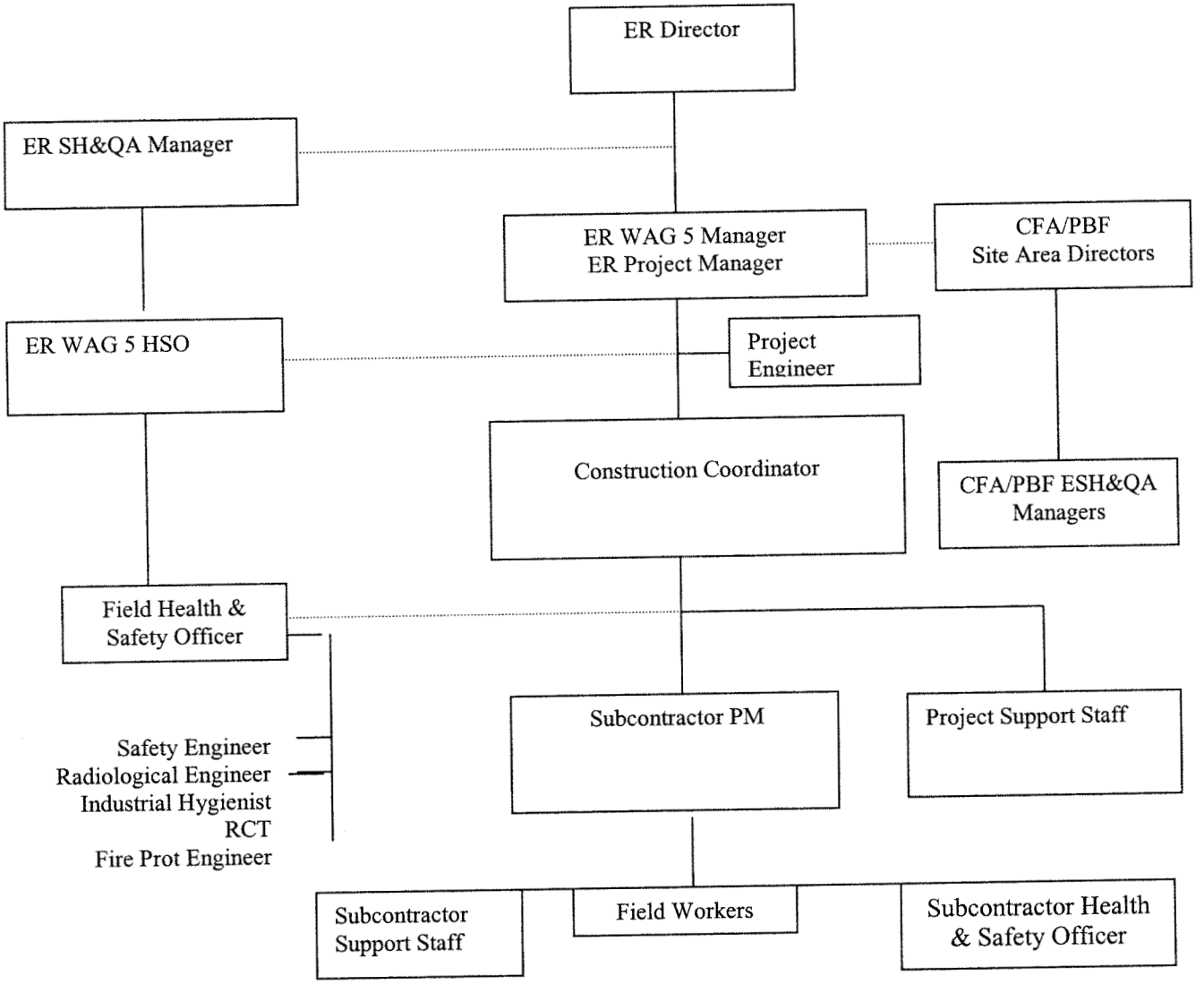

Figure C-2.1. Field organization chart for OU 5-12 RD/RA contaminated soil sites remediation projects.

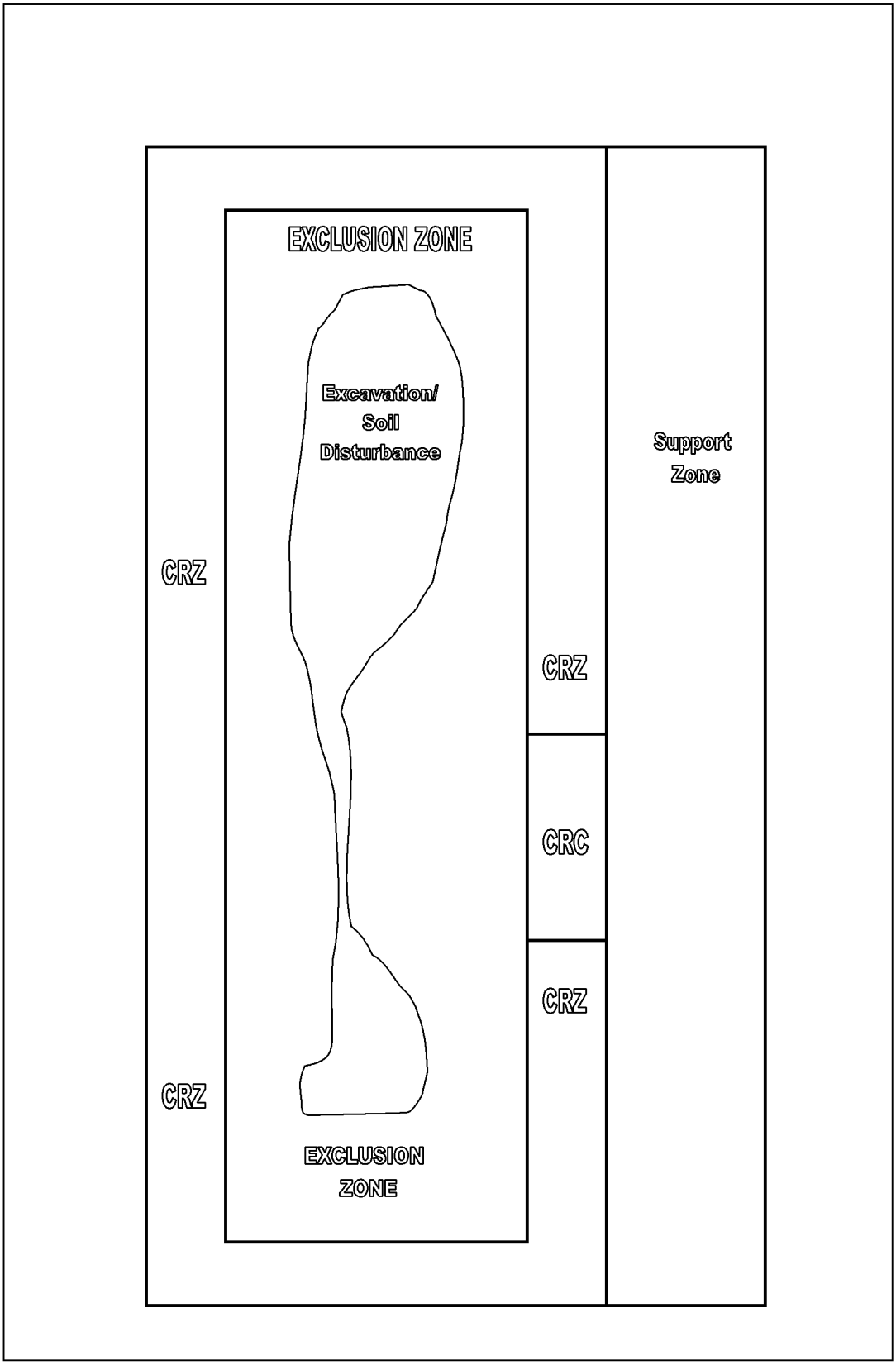

Figure C-7.1. Example of site control zones.

C-8. HAZARD ASSESSMENT

Section 8 of this HASP provides general information regarding the types of hazards that may be encountered while performing OU 5-12 RD/RA work. Specific hazards associated with the Contaminated Soil Sites Remediation Projects as identified on the Hazard Identification and Mitigation Checklist per STD-101 and the Hazards Identification and Mitigation process are presented in this section.

The general hazards identified for the remediation activities at ARA-01, ARA-12, ARA-23, and PBF-16 are based on the Hazards Identification and Mitigation Checklist for the activities and are summarized in Table C-8.1.

Table C-8.1. Activities and associated hazards at ARA-01, ARA-12, ARA-23, and PBF-16.

Activity or Task	Associated Hazards or Hazardous Agent
Mobilization	Equipment movement
	Heat/cold stress
	Manual material handling
	Radiological exposure
	Slip/trip hazards due to walking/working surface
Performance of Work/Soil Disturbances	Radiological exposure
	Chemical/inorganic contaminants/dust exposure
	Equipment movement
	Hoisting and rigging
	Repetitive motion
	Manual material handling
	Fuels/flammable liquids
	Slip/trip hazards due to unstable working surfaces
	Noise
	Confined space
	Fall hazards
	Excavation/surface penetration
	Biological hazards
	Heat/cold stress
Demobilization	Equipment movement
	Slip/trip hazards due to walking surfaces
	Heat/cold stress
	Manual materials handling
	Radiological exposure

Each of these hazards is discussed in Section 8 of this HASP. The FTL and HSO will ensure all personnel are provided site-specific training per Section 4 of this HASP that includes each of these hazards and the mitigation in Section 8 prior to permitting personnel to work at these sites.

Personnel will be potentially exposed to chemical and radiological agents while working at the OU 5-10 RD/RA Contaminated Soil Project Sites. The magnitude of these hazards to personnel entering the work zones is dependent on both the chemical/radiological nature of the contaminants encountered and the intrusive tasks being performed. Table C-8.2 lists the radiological and nonradiological contaminants, route of exposure, symptoms of overexposure, and overexposure potential.

Table C-8.2. Radiological and nonradiological contaminants.

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-12	Radiolonuclides Ag-108m	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12, ARA-23	Am-241	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-12	Co-60	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12, ARA-23	Cs-137	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23	Sr-90	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-12	U-234	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23	U-235	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12	Pu-238	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01	Pu-239/-240	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23	Ra-226	Inh, Ing, external exposure	NA/Lung, bone marrow, kidney, whole body	Low
	Metals			
ARA-01	Arsenic	Inh, Abs, Contact, Ing	Ulceration of nasal septum, dermatitis, gastrointestinal (GI) disturbances, respiratory irritation, hyperpimenation of skin/ liver, kidneys, skin, lungs, lymphatic system	Low

Table C-8.2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-01, ARA-12	Lead	Inh, Ing, Contact	Weakness, insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, tremors, encephalopathy, nephropathy, eye irritation, hypotension/GI tract, central nervous system (CNS), kidneys, blood	Low
ARA-12	Manganese	Inh, Ing	Parkinson's, asthenia, insomnia, mental confusion, metal fume fever, dry throat, cough, tight chest, low back pain, fatigue/respiratory system, CNS, blood, kidneys	Low
PBF-16	Mercury	Inh, Ing, Abs, Contact	Ataxia, dysarthria, vision/hearing, spastic/jerky movements, dizziness, salivating, nausea, vomiting, diarrhea, constipation, skin burns, emotional distress/CNS, kidneys, eyes, skin	Low
ARA-01	Thallium	Inh, Abs, Ing, Contact	Nausea, diarrhea, abdominal pain, vomiting, ptosis, strabismus, tremors, chest pain, pulmonary edema, chorea, psychosis, liver/kidney damage, eyes, CNS, lungs, kidneys, liver, GI, hair	Low

Engineering and administrative controls will be implemented (whenever possible), along with adequate work practices, real-time monitoring of contaminants, and site-specific hazard training to further mitigate potential exposures and hazards. Table C-8.3 lists monitoring equipment for the radiological and nonradiological hazards.

Table C-8.3. Monitoring equipment for radiological and nonradiological hazards.

Monitored or Sampled Hazard	Monitoring/Sampling Equipment Method
Radionuclides (beta-gamma)	Ludlum 2A or equivalent
Radionuclides (alpha)	Ludlum 61 or equivalent
VOCs	PID or detector tubes
Noise	Sound level meter and/or noise dosimeters
Heat/Cold Stress	Heat Stress – WBGT, body wt, fluid intake
	Cold Stress – ambient air temperature, wind chill charts

Air sampling will be conducted, as deemed appropriate, by the project IH and RCT based upon initial direct-reading instrument data, swipes, and other site factors.

VOC = volatile organic compound

WBGT = Wet Bulb Globe Temperature

PID = Photoionization Detector

C-9. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) requirements for the OU 5-12 RD/RA Contaminated Soil Sites Remediation Projects is provided in Table C-9.1. Refer to Section 9 of this HASP for additional descriptions and requirements on PPE.

C-10. DECONTAMINATION PROCEDURES

Every effort will be made to prevent the contamination of personnel and equipment through the use of engineering controls, good work practices, and personal protective equipment. The IH and RadCon will specify PPE requirements to prevent personnel contamination as well as specifying the sampling methods and decontamination process used. Dry decontamination of equipment used in support of the soil removal will be conducted as per RadCon and IH direction. The equipment will be visually inspected and surveyed by the RCT to verify removal of contaminated soil. For information describing contamination control and prevention and emergency decontamination procedures, refer to Section 10 of this HASP.

C-11. EMERGENCY RESPONSE PLAN

The FTL and HSO will be responsible to ensure Section 11 of this HASP is implemented prior to commencement of this project. This includes ensuring proper facility and emergency organization notifications are made prior to field mobilization. The following project-specific emergency response equipment will be available on site per Table C-11.1.

Table C-9.1. PPE requirements for OU 5-12 RD/RA Soil Site remediation projects.

Task or Assignment	Level of PPE	Modifications and Comments
1. Project Mobilization at all locations	Level D	All mobilization tasks in the support zone (SZ) will be conducted in Level D PPE meeting the minimum Environmental Restoration (ER) field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	Modified Level D	Modification will be per the task Safe Work Permit (SWP) for chemical concerns in the Exclusion Zone as determined by the Industrial Hygienist (IH) and the Radiological Work Permit (RWP) for radiological concerns per RadCon.
2. Performing Field Work/Soil Disturbances	Modified Level D(ARA-07, ARA-08, ARA-13, ARA-21)	Modified Level D (protective clothing) per the task SWP for chemical concerns in the Exclusion Zone as determined by the Industrial Hygienists (IH) and the task RWP for radiological concerns per RadCon.
3. Demobilization	b) Level D	All demobilization tasks in the SZ will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (with hand protection for material handling).
	b) Modified Level D	Modification will be per the task SWP for chemical concerns in contamination reduction zone/exclusion zone as determined by the IH and the RWP for radiological concerns per RadCon.

Table C-11.1. Emergency response equipment.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers	CRZ/EZ entrance	HSO	Monthly
First aid supplies	Support zone	HSO	Weekly
Eyewash station	Support zone	HSO	Monthly
Hazardous materials spill kit	Project vehicle, administrative trailer	HSO	Monthly
Communication equipment	FTL or project vehicle	HSO	Daily

Refer to Section 11 of this HASP for the emergency contacts and notification requirements. The FTL will ensure all personnel are aware of emergency information contained in Section 11 of this HASP during the project-specific HASP training.

Appendix D

Groundwater Monitoring for Waste Area Group 5

Appendix D

Groundwater Monitoring for Waste Area Group 5

D-1. INTRODUCTION

This Operable Unit (OU) 5-12 Remedial Design/Remedial Action (RD/RA) Health and Safety Plan (HASP) appendix establishes the procedures and requirements that will be used to eliminate and/or minimize health and safety risks to personnel performing groundwater monitoring in Waste Area Group (WAG) 5. For information on the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of this HASP.

D-1.1. INEEL Site Description

For details on the location and operational history of the Idaho National Engineering and Environmental Laboratory (INEEL) and the Power Burst Facility/Auxiliary Reactor Area (PBF/ARA), see Section 1 and Figures 1-1 and 1-2 of this HASP.

D-1.2. Scope Of Work

Surveillance monitoring of the groundwater beneath the ARA and PBF facilities will resume as a component of the selected remedy for WAG 5 as specified in the *Final Record of Decision for Power Burst Facility and Auxiliary Reactor Area* (DOE-ID 2000), hereinafter referred to as the Record of Decision (ROD). Groundwater monitoring is not required to satisfy WAG 5 remedial action objectives or cleanup goals, but will reduce the uncertainty in previous sampling results and provide trend data to assess the possibility that an unidentified source of lead contamination is affecting the aquifer.

Groundwater monitoring samples will be collected, preserved, packaged, and analyzed as specified in the *Groundwater Monitoring Plan for the Waste Area Group 5, Remedial Action* (DOE-ID 10779). The WAG 5 well locations and groundwater gradient are shown in Figure D-1.

D-2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. The key roles and lines of responsibility/communication are shown in Figure D-2, "The project organization chart." Descriptions and responsibilities of the key site personnel are detailed in Section 2 of the HASP.

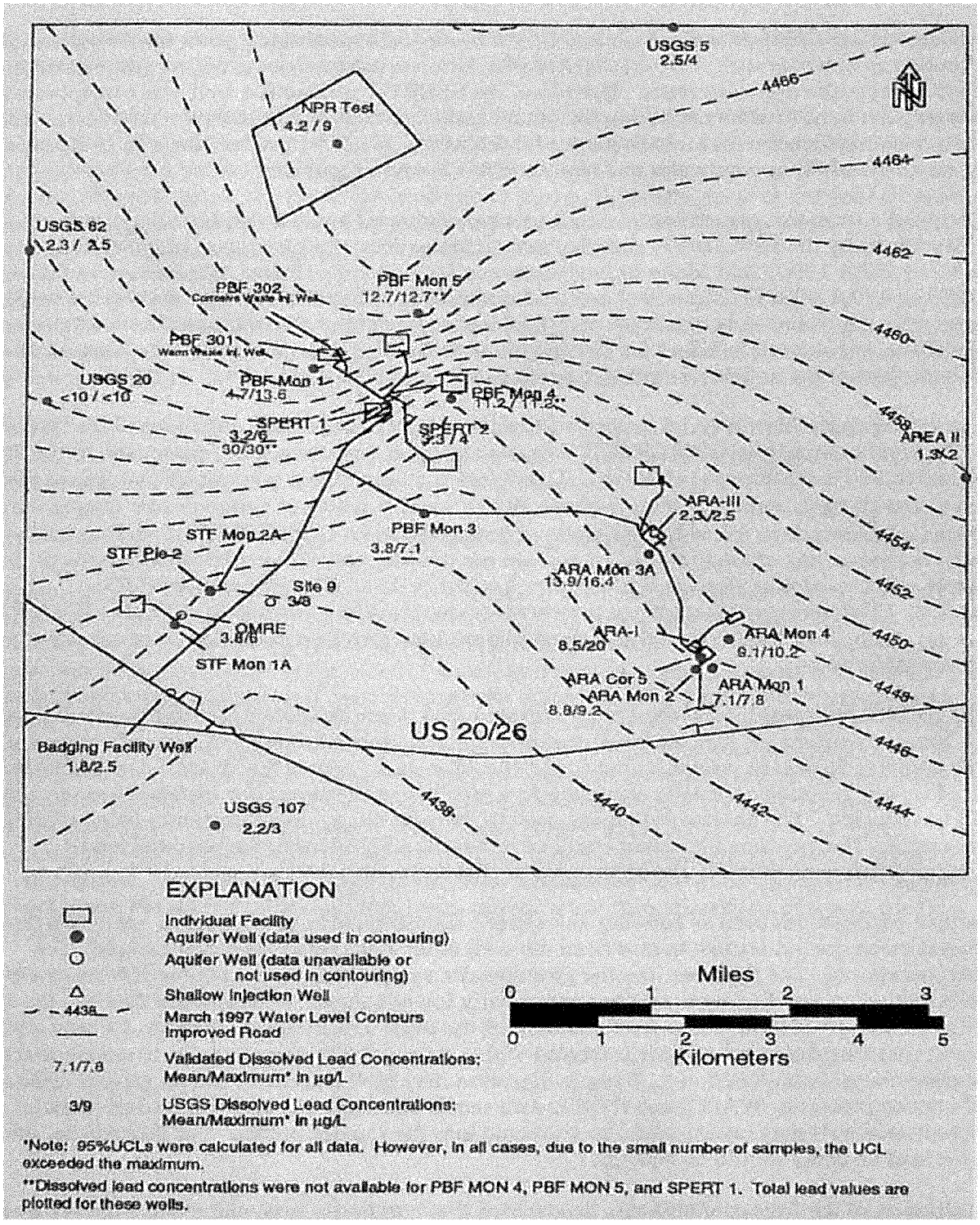

Figure D-1. Well locations and groundwater gradient in the WAG 5 area.

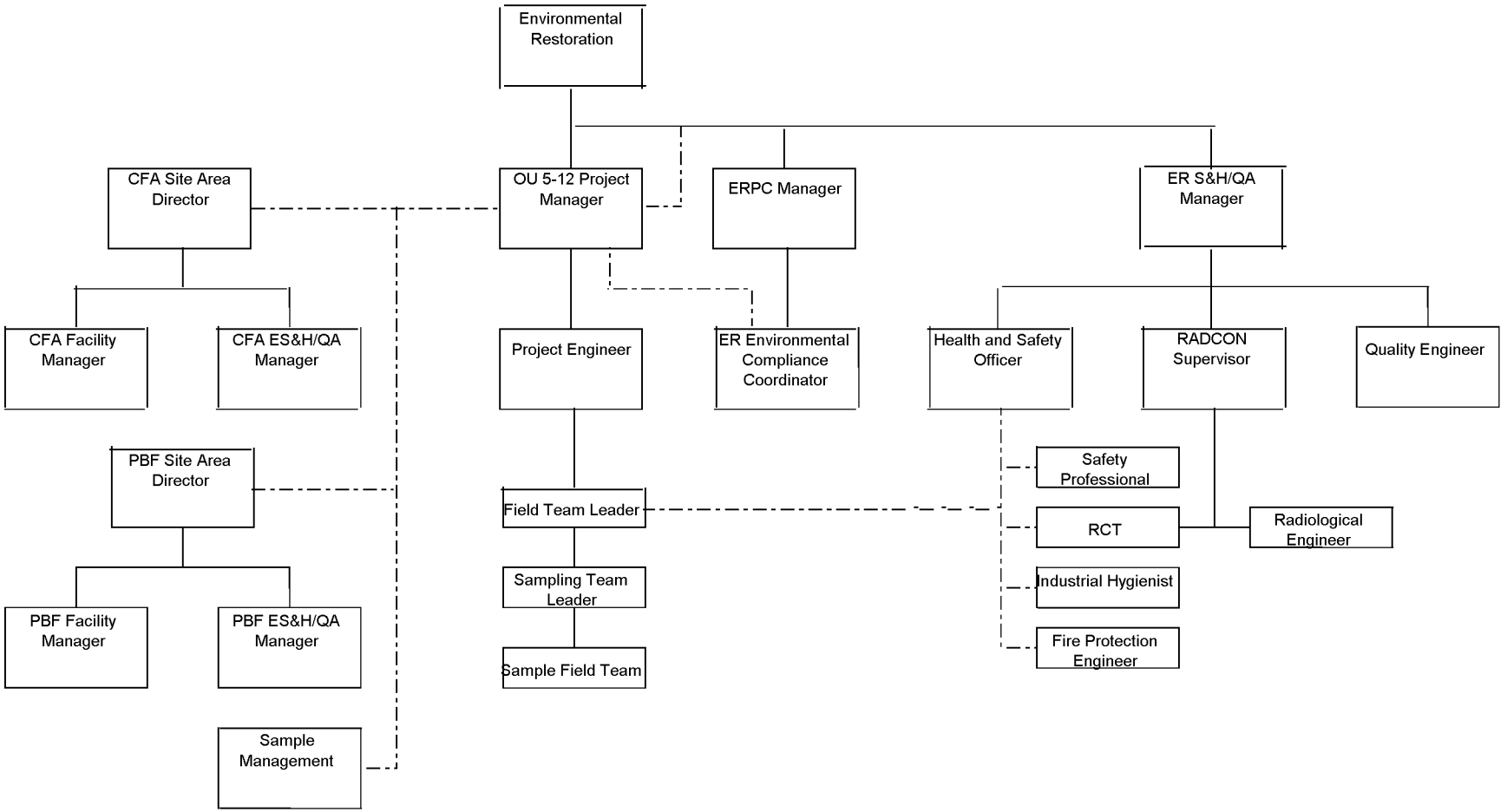

Figure D-2. . Project Organization Chart.

D-3. RECORD KEEPING REQUIREMENTS

There are no site-specific changes for record keeping requirements. Refer to Section 3 of this HASP for requirements regarding record keeping for this project.

D-4. PERSONNEL TRAINING

All site personnel will receive training as specified in Section 4 and Table 4-1 of this HASP as a minimum. Before beginning work at the site, site-specific training will be conducted, including a complete review of the HASP and this appendix. This review will include time for discussion and questions. Upon completing site-specific training, personnel will read and sign the form indicating they have received this training, understand the tasks and associated hazards, and agree to follow the HASP and other safety requirement documents. The Field Team Leader (FTL) will be responsible for verifying all personnel working at the site have completed the training specified in Table 4-1 prior to permitting personnel to enter the worksite.

D-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based upon the existing site-specific sampling information available for this project, there are no additional Occupational Medical Surveillance Program requirements. Refer to Section 5 of this HASP for information regarding the INEEL Occupational Medical Surveillance program requirements.

D-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed in accordance with approved work control documents that comply with Program Requirements Directive (PRD)-25, "Activity Level Hazard Identification, Analysis, and Control." Refer to Section 6 of this HASP for information regarding the Accident Prevention Program requirements.

D-7. SITE CONTROL AND SECURITY

Refer to Section 7 of this HASP for descriptions of potential work zones and areas. The FTL shall be responsible for ensuring the sample site is adequately controlled to prevent unauthorized entry. The FTL shall consult with the Health and Safety Officer (HSO), Industrial Hygienist (IH), Safety Engineer (SE), and Radiological Control Technician (RCT)as applicable for establishing and posting work zones, as necessary, to maintain control of the sampling sites.

D-8. HAZARD ASSESSMENT

Section 8 of this HASP provides general information regarding the types of hazards that may be encountered while performing OU 5-12 RD/RA work. Specific hazards associated with the groundwater monitoring are presented in this section.

Table D-1 below summarizes the anticipated activities to be performed and the associated hazards.

Table D-1. Activities and Associated Hazards.

Activity or Task	Associated Hazards or Hazardous Agent
Mobilization	Equipment movement/vehicle traffic
	Heat/cold stress
	Radiation/contamination exposure (soil contamination areas/radiologically posted areas)
	Slip/trip hazards due to walking/working surface
	Manual material handling
Perform Sampling Activities	Radiation/contamination exposure (soil contamination areas/radiologically posted areas)
	Chemical/inorganic contaminants
	Equipment movement/vehicle traffic repetitive motion/lifting during sample collection
	Sharp objects/laceration hazards
	Slip/trip hazards due to walking surfaces
	Biological hazards
	Heat/cold stress
Demobilization	Equipment movement
	Radiation/contamination exposure (soil contamination areas/radiologically posted areas)
	Slip/trip hazards due to walking surfaces
	Heat/cold stress
	Manual materials handling

Section 8 of this HASP provides specific information on manual material handling, electrical safety, equipment movement, heat/cold stress, working surfaces, biological hazards, and radiation exposure. It is important for personnel to review this information and understand the potential hazards.

Based upon previous sampling results, the WAG 5 groundwater is not considered hazardous. The IH will be consulted if future sampling data changes and shall specify any special precautions or sampling requirements and ensure controls are adequately documented on a Safe Work Permit (SWP) or Job Safety Analysis (JSA). Prior to entering or working in soil contamination areas or posted radiological areas, the FTL shall ensure the field sampling personnel consults with the applicable Central Facilities Area (CFA) or PBF Radiological Control organization.

D-9. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) requirements for the OU 5-12 RD/RA Groundwater Monitoring is provided in Table D-2. Refer to Section 9 of this HASP for additional descriptions and requirements on PPE.

Table D-2. PPE Requirements for OU 5-12 RD/RA Groundwater Monitoring.

Task or Assignment	Level of PPE	Modifications and Comments
1. Project Mobilization at all locations	a) Level D	All mobilization tasks will be conducted in Level D PPE meeting the minimum Environmental Restoration (ER) field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks).
2. Performing Field Work	Modified Level D	All tasks will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks). Sample handling can be performed using nitrile or rubber gloves to prevent skin contact with sample water.
3. Demobilization	Level D	All tasks will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks).

D-10. DECONTAMINATION PROCEDURES

Every effort will be made to prevent the contamination of personnel and equipment through the use of engineering controls, good work practices, and personal protective equipment. The IH shall specify PPE requirements to prevent personnel contamination as well as specifying the sampling methods and decontamination process used. For information describing contamination control and prevention and emergency decontamination procedures, refer to Section 10 of this HASP.

D-11. EMERGENCY RESPONSE PLAN

The FTL and HSO shall be responsible to ensure Section 11 of this HASP is implemented prior to commencement of this project. This includes ensuring proper facility and emergency organization notifications are made prior to field mobilization. The following project-specific emergency response equipment shall be available on site per Table D-3.

Table D-3. Emergency Response Equipment.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers[a]	Project vehicle	FTL/Sample Team Leader	Monthly
First aid supplies	Project vehicle	FTL/Sample Team Leader	Weekly
Eyewash station	Project vehicle	FTL/Sample Team Leader	Monthly
Hazardous materials spill kit	Project vehicle	FTL/Sample Team Leader	Monthly
Communication Equipment	FTL or project vehicle	FTL/Sample Team Leader	Daily

a. Consult the assigned safety or fire protection engineer to determine appropriate type and quantity of fire extinguisher(s).

Refer to Section 11 of this HASP for the emergency contacts and notification requirements. The FTL shall ensure all personnel are aware of emergency information contained in Section 11 of this HASP during the project-specific HASP training.

Appendix E

Rhizosphere Project Sample Collection

Appendix E

Rhizosphere Project Sample Collection

E-1. INTRODUCTION

This Operable Unit (OU) 5-12 Remedial Design/Remedial Action (RD/RA) Health and Safety Plan (HASP) appendix establishes the procedures and requirements that will be used to eliminate and/or minimize health and safety risks to personnel performing Rhizosphere Project Sample Collection in Waste Area Group (WAG) 5. For information on the requirements of the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120/1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of this HASP.

E-1.1. INEEL Site Description

For details on the location and operational history of the Idaho National Engineering and Environmental Laboratory (INEEL) and the Power Burst Facility/Auxiliary Reactor Area (PBF/ARA), see Section 1 and Figures 1-1 and 1-2 of this HASP.

E-1.2. Scope of Work

Three research plots have been identified. One is the "disturbed" plot and the other is the "undisturbed" plot, the third is a disturbed, contaminated plot. Each plot will be sampled monthly, on approximately the same day, according to the following plan. Sampling locations will be identified in the clean/control research plot and in the contaminated research plot and marked off with flags. Each month (March – September 2001) at approximately the same day of the month, samples will be collected within approximately a 3-m radius of each flag. Soil samples will be collected at each location and will include one as far away as possible from all vegetation, one underneath a crested wheatgrass plant, assuming both such plants are present within three meters of the flag. In addition, and if available, from each sampling site one entire clump of crested wheatgrass and/or one entire fescue plant will be dug up with associated soil, placed in a 1-gal plastic bag, and transported to the laboratory. The plant and soil samples will be analyzed at a Sample Management Office (SMO) approved laboratory, possibly the Idaho Nuclear Technology and Engineering Center (INTEC) analytical laboratory, for analysis.

The soil core samples will be collected to a depth of 12 inches with a 1-inch diameter coring device. The soil and plants from the clean/control site will be placed in a paper bag ready to be shipped for standard agronomic soil analysis. As the field samples are being collected, a composite will be accumulated for x-ray fluorescence (XRF) analysis.

From the contaminated site, the plant will be collected in the field. The shoot and roots will be separated in the field. The roots will be cleaned in the field and the shoots, roots, and soil will be shipped to a SMO laboratory in separate containers. As part of the analysis, the plant leaves will be counted and measured.

E-2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure of this project reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. The key roles and lines of responsibility/communication are shown in Figure E-1, "The project organization chart." Descriptions and responsibilities of the key site personnel are detailed in Section 2 of the HASP.

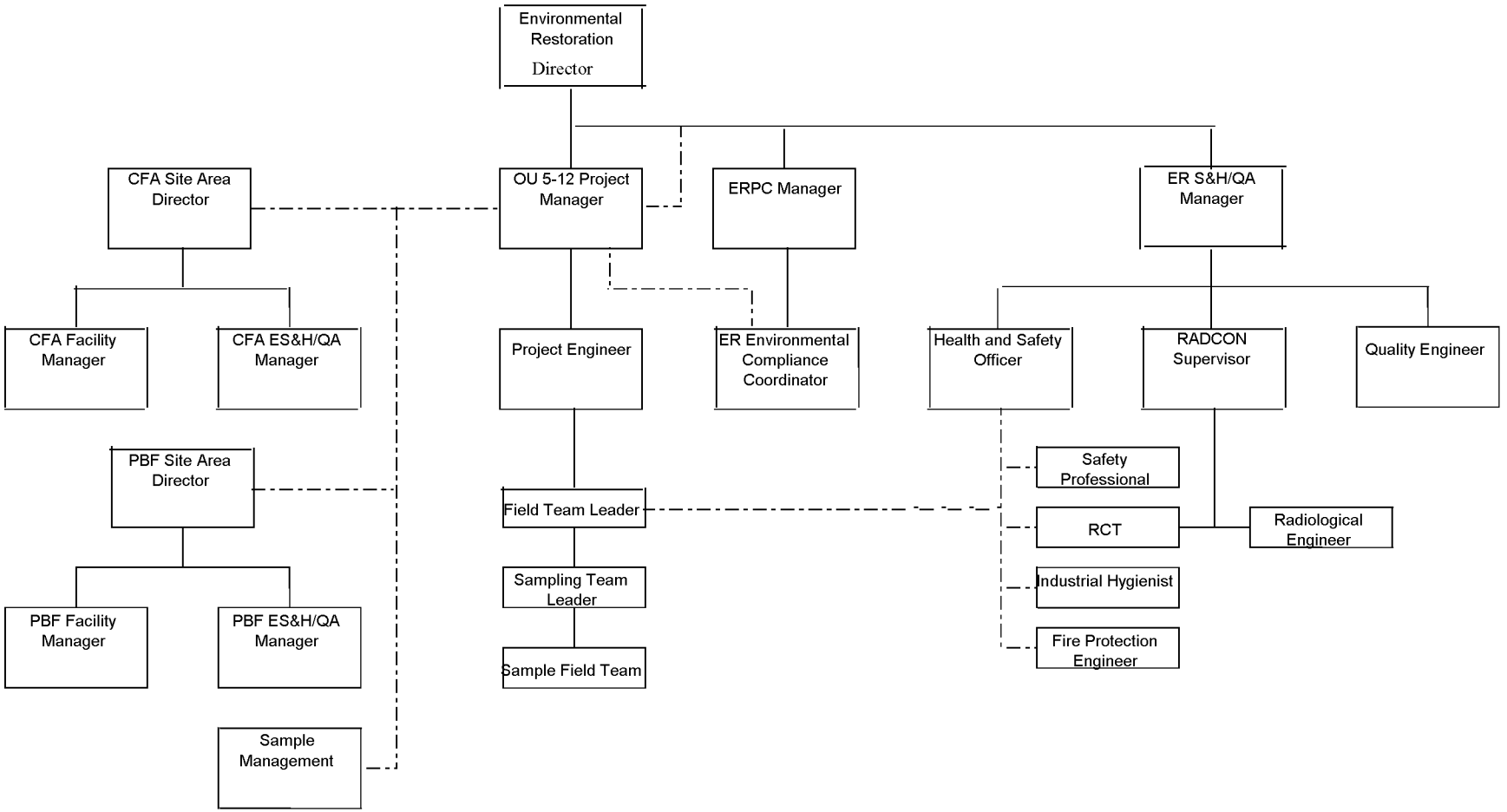

Figure E-1. Project Organization Chart.

E-3. RECORD KEEPING REQUIREMENTS

There are no site-specific changes for record keeping requirements. Refer to Section 3 of this HASP for requirements regarding record keeping for this project.

E-4. PERSONNEL TRAINING

All site personnel will receive training as specified in Section 4 and Table 4-1 of this HASP as a minimum. Before beginning work at the site, site-specific training will be conducted, including a complete review of the HASP and this appendix. This review will include time for discussion and questions. Upon completing site-specific training, personnel will read and sign the form indicating they have received this training, understand the tasks and associated hazards, and agree to follow the HASP and other safety requirement documents. The Field Team Leader (FTL) will be responsible for verifying all personnel working at the site have completed the training specified in Table 4-1 prior to permitting personnel to enter the worksite.

E-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based upon the existing site-specific sampling information available for this project, there are no additional Occupational Medical Surveillance Program requirements. Refer to Section 5 of this HASP for information regarding the INEEL Occupational Medical Surveillance program requirements.

E-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed in accordance with approved work control documents that comply with Program Requirements Directive (PRD)-25, "Activity Level Hazard Identification, Analysis, and Control." Refer to Section 6 of this HASP for information regarding the Accident Prevention Program requirements.

E-7. SITE CONTROL AND SECURITY

Refer to Section 7 of this HASP for descriptions of potential work zones and areas. The Sampling Team Leader (STL) shall be responsible for ensuring the sample site is adequately controlled to prevent unauthorized entry. The STL shall consult with the Health and Safety Officer (HSO), Industrial Hygienist (IH), Safety Engineer (SE), and Radiological Control Technician (RCT) as applicable for establishing and posting work zones, as necessary, to maintain control of the sampling sites.

E-8. HAZARD ASSESSMENT

Section 8 of this HASP provides general information regarding the types of hazards that may be encountered while performing OU 5-12 RD/RA work. Specific hazards associated with the groundwater monitoring are presented in this section.

Table E-1 below summarizes the anticipated activities to be performed and the associated hazards.

Table E-1. Activities and Associated Hazards.

Activity or Task	Associated Hazards or Hazardous Agent
Mobilization	Equipment movement/vehicle traffic
	Heat/cold stress
	Radiation/contamination and metals exposure (soil contamination areas/radiologically posted areas)
	Slip/trip hazards due to walking/working surface
	Manual material handling
Perform Sampling Activities	Radiation/contamination and metals exposure (soil contamination areas/radiologically posted areas)
	Manual material handling
	Equipment movement/vehicle traffic repetitive motion/lifting during sample collection
	Sharp objects/laceration hazards
	Slip/trip hazards due to walking surfaces
	Biological hazards
	Heat/cold stress
Demobilization	Equipment movement
	Radiation/contamination and metals exposure (soil contamination areas/radiologically posted areas)
	Slip/trip hazards due to walking surfaces
	Heat /cold stress
	Manual materials handling

Section 8 of this HASP provides specific information on manual material handling, electrical safety, equipment movement, heat/cold stress, working surfaces, biological hazards, and radiation exposure. It is important for personnel to review this information and understand the potential hazards.

The HSO and IH will be consulted and shall specify any special precautions or sampling requirements and ensure controls are adequately documented on a Safe Work Permit (SWP) or Job Safety Analysis (JSA). Prior to entering or working in soil contamination areas or posted radiological areas, the STL shall ensure the field sampling personnel consults with the applicable Central Facilities Area (CFA) or PBF Radiological Control organization for applicable requirements and possible Radiological Work Permit (RWP) access.

Personnel will be potentially exposed to chemical and radiological agents while working at the WAG 5 Contaminated Soil Project Sites. The magnitude of these hazards to personnel entering the work zones is dependent on both the chemical/radiological nature of the contaminants encountered and the intrusive tasks being performed. Table E-2 lists the radiological and nonradiological contaminants, route of exposure, symptoms of overexposure, and overexposure potential

Table E-2. Radiological and Nonradiological Contaminants.

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-12	Radiolonuclides Ag-108m	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12, ARA-23	Am-241	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-12, ARA-25	Co-60	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12, ARA-23, ARA-25	Cs-137	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-25	Eu-154	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23, ARA-25	Sr-90	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-12	U-234	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23	U-235	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-12	U-238	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-12	Pu-238	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01	Pu-239/-240	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-23, ARA-25	Ra-226	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-23	Th-230	Inh, Ing	NA/Lung, bone marrow, kidney, whole body	Low
ARA-01, ARA-25	Metals Arsenic	Inh, Abs, Contact, Ing	Ulceration of nasal septum, dermatitis, gastrointestinal (GI) disturbances, respiratory irritation, hyperpimenation of skin/liver, kidneys, skin, lungs, lymphatic system	Low
Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-12	Chromium	Inh, Ing	Fibrosis of lungs / respiratory system	Low
ARA-01, ARA-12, ARA-25	Lead	Inh, Ing, Contact	Weakness, insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, tremors, encephalopathy, nephropathy, eye irritation, hypotension/GI tract, Central Nervous System (CNS), kidneys, blood	Low

Table E-2. (continued).

Site	Material or Chemical	Route of Exposure	Symptom of Overexposure/Target Organs or System	Overexposure Potential
ARA-12	Manganese	Inh, Ing	Parkinson's, asthenia, insomnia, mental confusion, metal fume fever, dry throat, cough, tight chest, low back pain, fatigue/respirator system, CNS, blood, kidneys	Low
PBF-16	Mercury	Inh, Ing, Abs, Contact	Ataxia, dysarthria, vision/hearing, spastic/jerkey movements, dizziness, salivating, nausea, vomiting, diarrhea, constipation, skin burns, emotional distress/CNS, kidneys, eyes, skin	Low
ARA-01	Thallium	Inh, Abs, Ing, Contact	Nausea, diarrhea, abdominal pain, vomiting, ptosis, strabismus, tremors, chest pain, pulmonary edema, chorea, psychosis, liver/kidney damage, eyes, CNS, lungs, kidneys, liver, GI, hair	Low

Engineering and administrative controls will be implemented (whenever possible) along with adequate work practices, real-time monitoring of contaminants, and site-specific hazard training to further mitigate potential exposures and hazards. Table E-3 lists monitoring equipment for the radiological and non-radiological hazards.

Table E-3. Monitoring Equipment For Radiological and Nonradiological Hazards.

Monitored or Sampled Hazard	Monitoring/Sampling Equipment Method
Radionuclides (beta-gamma)	Ludlum 2A or equivalent
Radionuclides (alpha)	Ludlum 61 or equivalent
VOCs	PID or detector tubes
Noise	Sound level meter and/or noise dosimeters
Heat/Cold Stress	Heat Stress – WBGT, body wt, fluid intake
	Cold Stress – ambient air temperature, wind chill charts

Air sampling will be conducted, as deemed appropriate, by the project IH and RCT based upon initial direct-reading instrument data, swipes, and other site factors.

VOC- volatile organic compound

WBGT – Wet Bulb Globe Temperature

PID – Photoionization Detector

E-9. PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) requirements for the Rhizosphere Project Sampling in WAG 5 are provided in Table E-4. Refer to Section 9 of this HASP for additional descriptions and requirements on PPE.

Table E-4. PPE Requirements for Rhizosphere Project Sampling in WAG 5.

Task or Assignment	Level of PPE	Modifications and Comments
1. Project Mobilization at all locations	Modified Level D	All tasks will be conducted in Level D PPE meeting the minimum Environmental Restoration (ER) field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks). Shoe/boot covers and gloves may be specified by the RCT based on work locations in soil contamination areas.
2. Performing Field Work	Modified Level D	All tasks will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks). Sample handling in contamination areas will be performed using nitrile or leather gloves to prevent skin contamination. Shoe/boot covers may be specified by the RCT based on work locations in soil contamination areas.
3. Demobilization	Modified Level D	All tasks will be conducted in Level D PPE meeting the minimum ER field work PPE requirements of hard hat, safety glasses, and sturdy leather boots above the ankle (steel-toe boots and leather gloves for material handling tasks). Shoe/boot covers and gloves may be specified by the RCT based on work locations in soil contamination areas.

E-10. Decontamination Procedures

Every effort shall be made to prevent the contamination of personnel and equipment through the use of engineering controls, good work practices, and personal protective equipment. The RCT and/or IH shall specify PPE requirements to prevent personnel contamination as well as specifying the sampling methods and decontamination process used. For information describing contamination control and prevention and emergency decontamination procedures, refer to Section 10 of this HASP.

E-11. EMERGENCY RESPONSE PLAN

The FTL and HSO shall be responsible to ensure Section 11 of this HASP is implemented prior to start of this project. This includes ensuring proper facility and emergency organization notifications are made prior to field mobilization. The following project-specific emergency response equipment shall be available on site per Table E-5.

Table E-5. Emergency Response Equipment.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers[a]	Project vehicle	FTL/Sample Team Leader	Monthly
First aid supplies	Project vehicle	FTL/Sample Team Leader	Weekly
Portable Eyewash station	Project vehicle	FTL/Sample Team Leader	Monthly
Hazardous materials spill kit	Project vehicle	FTL/Sample Team Leader	Monthly
Communication Equipment	FTL or project vehicle	FTL/Sample Team Leader	Daily
Shovel[b]	Project vehicle	FTL/Sample Team Leader	Prior to off road driving

a. Consult the assigned safety or fire protection engineer to determine appropriate type and quantity of fire extinguisher(s).

b. Shovel required for off road access.

Refer to Section 11 of this HASP for the emergency contacts and notification requirements. The FTL shall ensure all personnel are aware of emergency information contained in Section 11 of this HASP during the project-specific HASP training.