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Revision 4 Draft A

Surveillance and Maintenance Plan for the 202-S Reduction Oxidation (REDOX) Facility

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

U.S. DEPARTMENT OF ENERGY Richland Operations Office
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Surveillance and Maintenance Plan for the 202-S Reduction Oxidation (REDOX) Facility

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Terms

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CRD	Contractor Requirements Document
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
IDW	investigation-derived waste
ISMS	Integrated Safety Management System
NESHAP	"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61)
PCB	polychlorinated biphenyl
ppm	parts per million
QA	quality assurance
QAPD	quality assurance program description
REDOX	Reduction-Oxidation (Facility)
RCRA	*Resource Conservation and Recovery Act of 1976*
RL	DOE Richland Operations Office
S&M	surveillance and maintenance
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*

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1 Introduction

The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a) ensures compliance with the *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended. The Tri-Party Agreement sets forth certain requirements and milestones for cleanup activities at the Hanford Site. The Tri-Party Agreement was signed by the U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology in 1989 to implement CERCLA cleanup of hazardous substances threatening the environment, and to bring all active management of hazardous wastes into full RCRA compliance. In the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Tri-Party Agreement Action Plan) (Ecology et al., 1989b), the Reduction-Oxidation (REDOX) facility was originally identified in Section 8.1.2 as a "key facility," which meant that, along with Hanford's nuclear reactors and the other plutonium-extraction facilities, it was not fully addressed under Section 6.0 (treatment, storage, and disposal [TSD] units needing to be brought into compliance with RCRA) or Section 7.0 (operable units being actively addressed through the CERCLA remedial action process); therefore, the facility would be managed in accordance with the facility decommissioning process in Section 8.0 of the Tri-Party Agreement Action Plan. Subsequent revision to Section 8.0 clearly stipulates that facility's "…final disposition to be addressed using CERCLA remedial action coordinated with RCRA closure" (Ecology et al., 1989b).

At the present time, REDOX is in a surveillance and maintenance (S&M) phase, and all activities at REDOX that manage hazardous substances (e.g., implementation of the REDOX S&M plan or stack maintenance activities) are onsite "removal actions" and are exempt from all administrative, procedural, permitting, and enforcement requirements of other environmental laws, including RCRA. REDOX is a facility where the residual hazardous substances within it present a "threat of a release of hazardous substances." The hazardous materials that remain at the REDOX facility are identified in Appendix A of this S&M plan These substances trigger the application of CERCLA to the site, including DOE's authority (delegated via Presidential Executive Order 12580, *Superfund Implementation*) as the CERCLA lead agency to implement CERCLA removal and remedial actions under Section 104, "Response Authorities," and pre-emption of RCRA and other environmental laws under Section 121(e)(l), "Cleanup Standards," "Permits and Enforcement." REDOX is currently in the remedial investigation phase, and the S&M activities at REDOX that manage hazardous substances (e.g., implementation of the REDOX S&M plan or stack maintenance activities) are onsite "removal actions" and are exempt from all administrative, procedural, permitting, and enforcement requirements of other environmental laws, including RCRA. Maintenance activities will be performed, as necessary, to support risk reduction and address a threat of release of hazardous substances. In the event that it is more effective and efficient to remove a deteriorated/dilapidated structure or equipment instead of performing continual maintenance activities, that action will be taken. Consistent with CERCLA, the applicable or relevant and appropriate requirements (ARARs) for implementing the S&M activities are identified in Table 6-1 in Chapter 6 of this S&M plan.

This document provides the plan for the S&M phase of the REDOX facility. This plan has been prepared in accordance with the Tri-Party Agreement Action Plan, Section 8.0, "Facility Disposition Process" (Ecology et al., 1989b), and will remain in effect until the remedial design/remedial action work plan has been approved. The objectives of the S&M phase are to ensure adequate containment of any contaminants left in place, provide physical safety and security controls, and maintain the facility in a manner that will minimize risk to human health or the environment. S&M plans are prepared by the DOE, Richland Operations Office (RL) and detail facility aspects and associated requirements, including

the following: (1) surveillance; (2) maintenance; (3) quality assurance (QA); (4) radiological controls; (5) hazardous substance inventory, management, and protection; (6) health and safety/emergency preparedness; (7) safeguards and security; (8) cost and schedule; and (9) environmental compliance. A list of the buildings managed as part of the REDOX facility S&M plan or a list of implementing procedures can be obtained by contacting the manager of the project responsible for managing REDOX.

2 Facility Activities

Activities conducted during the S&M phase are established to monitor containment of contaminants left in place, provide physical safety and security controls, and maintain the facility in a manner that will minimize risk to human health or the environment. If hazardous substances are discovered during S&M activities that present a spill or release from a TSD unit, or a hazard to personnel; present an obstacle to performance of surveillance, maintenance, remedial investigation, feasibility studies, or authorized response actions; or present a threat of release of hazardous substances (e.g., through contamination of the air within the facility), then it is the responsibility of DOE as the facility owner to respond to such a spill, release, hazard, or threat as quickly as possible, under CERCLA, RCRA, 10 CFR 830 ("Nuclear Safety Management"), 10 CFR 851 ("Worker Safety and Health Program"), and 40 CFR 300 ("National Oil and Hazardous Substances Pollution Contingency Plan"). Any arbitrary limit on the scope of the response to these conditions would be contrary to the applicable legal requirements. If the conditions requiring response are so extensive or complex that additional planning and resources are needed (e.g., preparation of an action memorandum), the applicable process for preparing and approving the response action will involve DOE oversight and authorization. Waste generated while performing S&M activities will be managed and dispositioned according to the ARARs (Table 6-1) and the waste control plan (provided as Appendix B of this S&M plan).

2.1 Historical Background

This section of the REDOX S&M plan discusses the facility's operational history, includes prior usage of the facility, previous processes that resulted in hazardous and radioactive contamination, and completed disposition activities.

The REDOX facility, also known as S Plant and the 202-S Facility, is located in the southwest portion of the 200 West Area of the Hanford Site. The REDOX facility was constructed in accordance to the design codes, standards, and regulations in place at the time of construction. The REDOX facility, which was constructed between 1950 and 1952, was the first large-scale, continuous-flow, solvent-extraction process plant built in the United States for recovering plutonium from irradiated uranium fuel. The extraction process, which replaced the batch precipitation methods first used at the Hanford Site, was designed to separate uranium, plutonium, and neptunium as individual product streams from associated fission products in the irradiated fuel. The plant operated from 1952 until 1967. Deactivation started in 1967 and was completed in 1969, when the REDOX Facility was transferred to S&M. Further details regarding REDOX deactivation can be found in *REDOX Deactivation* (ISO-1108). Deactivation included multiple flushes using water, diluted hot nitric acid, permanganate, and oxalic acid. The facility was flushed regularly with water for nearly a year after the initial cleaning.

The deactivated REDOX facility contains buildings and process equipment formerly used for dissolution and separation of uranium, neptunium, and plutonium, as well as deactivated equipment formerly used for waste concentration, waste neutralization, and solvent recovery. In addition to the main process areas, the REDOX facility includes buildings that were formerly used to store chemicals and materials and support systems (e.g., ventilation, exhaust stacks, and environmental monitoring systems). The REDOX facility will remain unoccupied for the duration of S&M activities.

Completion of these activities has established a safe and environmentally secure configuration suitable for a long-term S&M program.

Not all the hazardous materials were removed when the facility was deactivated. Those hazardous materials remaining in the facility are listed in Appendix A of this S&M plan.

2.2 Facility Description

This section of the S&M plan describes the major structures and operations of active systems and includes the status of systems such as ventilation, fire protection, radiation detection, remote monitoring, utility distribution, compressed air, and water.

The S&M of the REDOX facility includes the 202-S Building, ancillary buildings, and their associated equipment within the REDOX perimeter fence and encompasses approximately 13 buildings, which are listed in Table 2-1 (see area of contamination in Figure 2-1).

Table 2-1. REDOX Facility Structures and Components

Identification #	Building Description/Components
202-S	Canyon and service building
211-S	Liquid chemical storage tank farm
233-S & SA	Slabs (remaining after demolition)
2706-S	Slab (remaining after demolition)
2708-S	Lager storage building
2710-S	Nitrogen storage building
271 1-S	Stack gas monitoring building
2715-S	Storage building
2718-S	Sand filter sample building
276-S	Solvent handling facility
2904-SA	Cooling water sampling building
291-S	Canyon exhaust system (exhaust building, sand filter and stack)
291-S-l	Exhaust stack
292-S	Control and jet pit house
293-S	Nitric acid recovery and iodine backup building

2.2.1 Inactive Waste Sites

The scope of the S&M program is limited to the facilities described in Section 8.0 of the Tri-Party Agreement Action Plan (Ecology et al., 1989b); therefore, waste sites are not addressed in this document.

2.2.2 Operational Systems Description

The REDOX facility canyon building exhaust system; fire protection system; canyon compressed air system; surveillance lighting system; and the instrumentation, monitoring, and control system are the only systems operating during the S&M phase.

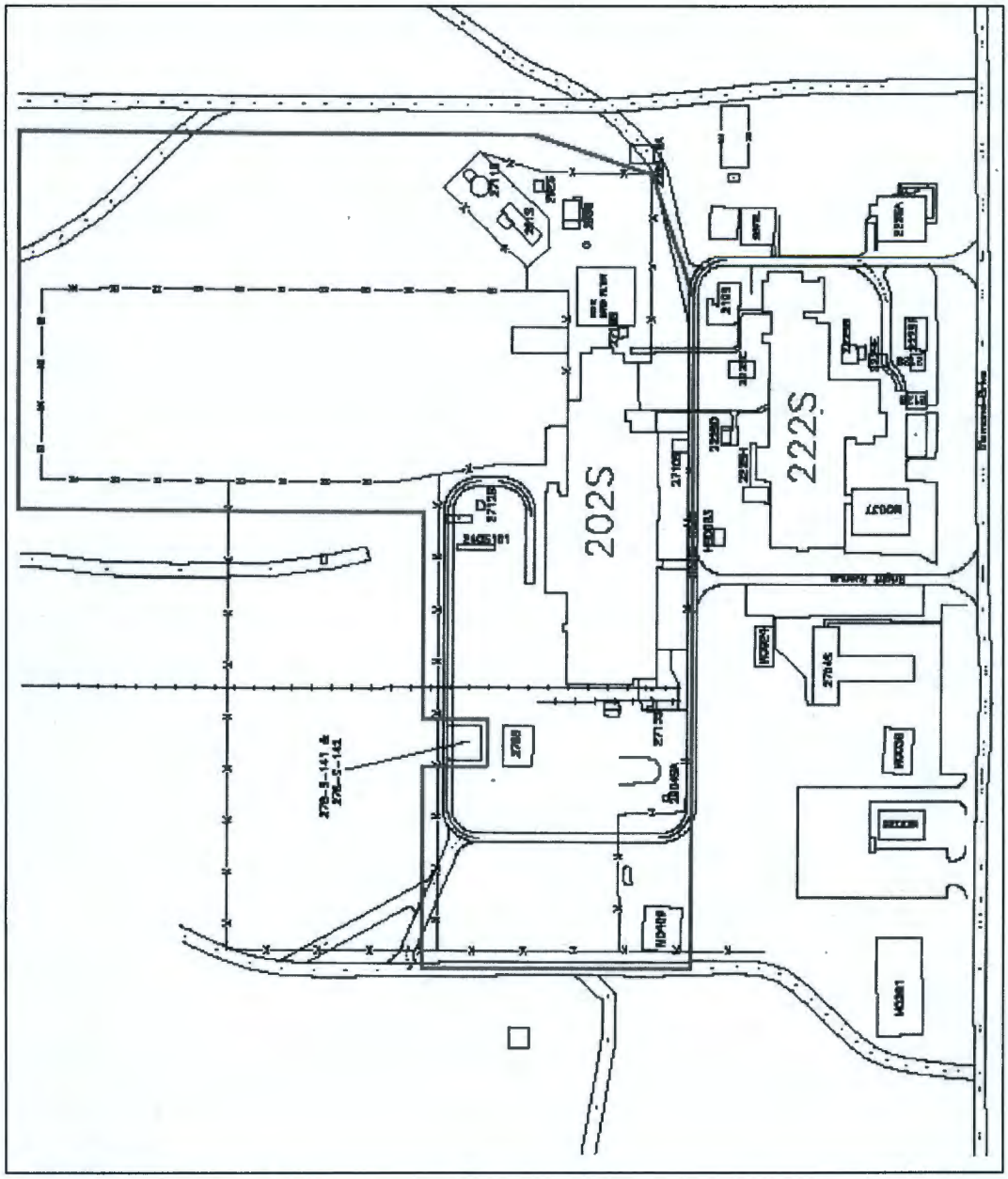

Figure 2-1. REDOX Area of Contamination

2.2.2.1 Electrical

The original electrical distribution system to REDOX is isolated and disconnected. Power for the canyon ventilation exhaust fans, compressed air, supporting control system, canyon gallery heating, canyon 60-ton crane, and surveillance lighting are supplied from two 13.8 kV lines: one line supplies a 13.8 kV/480 V transformer supplying the majority of the loads in the facility, and the second line supplies a 13.8 kV/240/120 V transformer for the surveillance lighting system.

2.2.2.2 Canyon Ventilation System

The 202-S canyon S&M ventilation system provides a negative pressure in the facility with respect to atmosphere. Two parallel exhaust fans operate in a run-standby configuration and discharge through a stack, all of which are located in the yard east of the canyon. Each fan is designed for 100 percent airflow. Infiltration air enters the canyon through the galleries, air locks, and the silo building. The S&M filtration system is made up of a single air path from the canyon facility via a wind tunnel, sand filter, fans, and stack.

2.2.2.3 Instrumentation, Monitoring, and Control System

A programmable logic control system with components located in the 202-S and 291-S Buildings provides data acquisition for monitoring data and controls for the ventilation system exhaust fans and the stack flow and sampling systems. Remote monitoring, control, and alarm are provided.

2.2.2.4 Fire Protection System

The fire protection system is a three-zone heat detection/fire alarm system that responds to heat detection or manual pull stations. The system transmits an alarm signal via a radio fire alarm reporter box to the central fire alarm system in the 200 West Fire Station.

2.2.2.5 Water Systems

Water systems to the facility structures have been isolated. Active fire hydrants are supplied by sanitary and raw water utility lines located in the facility yard.

2.3 Surveillance Activities

This section describes the surveillance activities to be conducted on a routine and nonroutine basis by the S&M contractor. Routine activities ensure that structural and passive confinement integrity is maintained. Nonroutine activities include major responses to undesirable observations (e.g., action to be taken if damaged friable asbestos is present). The canyon area, which includes the process cells, cover blocks, deck, and overhead space, will not be accessed during the S&M phase.

2.3.1 Environmental Monitoring of the Canyon Ventilation System Stack

In accordance with 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" (NESHAP), Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," criteria, the 291-S-l ventilation system stack is designated as a minor stack. This designation is due to the stack's low potential to emit radionuclides into the air such that the discharge could not cause an effective dose equivalent to any member of the public in an unrestricted area in excess of 0.1 mrem/yr. Surveillance activities will include stack monitoring, as discussed in the air monitoring plan provided in Appendix C of this S&M plan.

2.3.2 Annual Surveillance

Indoor surveillance will consist of a walkthrough of the 202-S galleries, aqueous makeup, and silo galleries as identified in the contractor's annual REDOX facility surveillance procedure. The annual S&M contractor walkthrough surveillance includes checking for indications of the following:

- Internal and/or external structural defects
- Roof deterioration
- Posting deficiencies
- Contamination migration
- Suspect hazardous materials
- Hazardous conditions
- Electrical hazards
- Unidentified friable asbestos
- Failed lights
- Doors unlocked
- Water leaks
- Excess combustible materials
- Excess equipment or material
- Ground subsidence
- Inadequate housekeeping
- Occupational hazards
- Previously unidentified hazards
- Unidentified or unlabeled containers
- Animal or insect intrusion

In addition, routine general housekeeping (e.g., tumbleweed and miscellaneous debris removal) is performed throughout the REDOX complex.

A qualified contractor structural engineer will conduct an inspection of the roof and structures of those facilities that provide a passive confinement function. The frequency, extent of future inspections, and recommendations resulting from these periodic inspections will be documented by the contractor structural engineer.

2.3.3 Routine Surveillance

Routine surveillance governed by S&M contractor's operations, maintenance, radiological work packages, and procedures is performed in addition to annual walkthrough surveillance to ensure adequate facility S&M phase operation. These S&M contractor documents establish the frequency and activities necessary to monitor, control, and thereby preclude potential health and safety impacts and equipment failure.

The S&M contractor's documents describe the required surveillance and frequency for the remaining active equipment. The S&M contractor's documents also describe the preventive maintenance and instrument calibrations to maintain the remaining active equipment. The radiation protection procedures, radiation work permit, and radiological condition assessments describe the radiological control activities such as posting, access control, work place air monitoring, and radiological surveys.

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3 Facility Maintenance

This chapter describes the methodology applied by DOE to ensure that the S&M contractor establishes preventive and corrective maintenance activities to be performed. Preventive maintenance is conducted on a pre-scheduled basis to ensure proper functioning of operational equipment. Corrective maintenance is performed after equipment has malfunctioned, has required structural repair due to degradation, or to upgrade facilities and/or equipment. Corrective maintenance includes activities necessary to control hazards, prepare facility buildings and structures for demolition, reduce risks, or reduce ongoing S&M costs. DOE will consult with the lead regulatory agency before performing actions that are so extensive or complex that additional planning and resources are needed, that remove facility components, or that involve activities intended to prepare buildings for demolition. Additionally, proposed work is screened to ensure that it is within the bounds of current nuclear safety documentation.

3.1 Maintenance Organization and Administration

The DOE requires the S&M contractor to develop and implement plans, programs, and procedures that specify maintenance program requirements for nuclear and non-nuclear facilities required by Contractor Requirements Document (CRD) O 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, and CRD O 430.1B, *Real Property Asset Management*. DOE conducts oversight of the S&M contractor's maintenance program implementation. CRD O 433.1B specifically mandates that the S&M contractor implement a maintenance management program using a graded approach.

3.2 Types of Maintenance

A proper balance of corrective and preventive maintenance is employed to provide a high degree of confidence that facility equipment degradation is identified and corrected. Preventive and corrective maintenance is conducted as described S&M contractor work control procedures.

3.3 Types of Maintenance and Frequency

The following maintenance and frequencies are recommended to satisfy code and specification, meet manufacturer's recommendations, and ensure optimum equipment operating lifetime during the S&M program:

- Inspect and lube canyon exhaust fans and bearings EF-1 and EF-2 (as recommended in procedures)
- Calibrate equipment controlled by and for canyon ventilation instrumentation and control system (as recommended in procedures)
- Sand filter aerosol test (determined from regulatory requirements)
- Inspect canyon ventilation stack monitoring system (determined from regulatory requirements)
- Ensure potential cold weather protection (as defined in the S&M contractor's cold weather protection program)

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4 Quality Assurance

The DOE requires the S&M contractor to comply with the requirements of 10 CFR 830, "Nuclear Safety Management," Subpart A, "Quality Assurance Requirements"; CRD O 414.1D, *Quality Assurance*; and state and federal environmental regulations, for the establishment and implementation of its QA program. The S&M contractor's quality assurance program description (QAPD), which is approved by DOE, describes the S&M contractor's implementation of these requirements. The QAPD is also the management system used for the conduct of environmental programs that acquire, generate, compile, report, and use environmental data and technology. The S&M contractor's QA program, as described by its QAPD, is to be applied on a graded basis to S&M contractor activities.

The QAPD requires the S&M contractor to establish and implement QA program/project plans for specific quality-affecting activities. These plans identify the applicable QA requirements; how the requirements are implemented; and the responsibilities, interfaces, and authority for their implementation. These plans also incorporate other local, state, and federal government QA requirements as established in applicable permits, agreements, orders, regulations, laws, codes, and standards.

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5 Training and Qualification

Personnel will be trained to the hazards associated with the S&M activities, and the information will be available consistent with standard work practices documentation.

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6 Environmental Compliance/Protection

This chapter identifies environmental compliance/protection requirements that are applicable to the S&M scope of work and has been prepared in accordance with the Tri-Party Agreement Action Plan, Section 8.0, "Facility Disposition Process" (Ecology et al., 1989b).

Appendix A of this S&M plan identifies the hazardous material remaining at the REDOX facility and describes the materials, locations, and quantities of mixed waste and hazardous materials covered by the scope of this plan. Hazards associated with these materials are minimal due to their remote locations and existing form.

6.1 Waste Management

For waste management activities under CERCLA, the identification, storage, treatment, and disposal of hazardous waste and the hazardous component of mixed waste generated during the S&M phase is subject to the substantive provisions of RCRA. The ARARs under CERCLA Section 121 are included in Table 6-1. The waste control plan provided in Appendix B of this S&M plan describes the implementation of the ARARs.

6.2 REDOX Facility Air Emission Controls

The requirements for air emissions associated with the REDOX facility are provided in Table 6-1. Implementation of the requirements for sources of emissions to ambient air is described in the air monitoring plan provided in Appendix C of this S&M plan. Under the DOE's Hanford Site Radioactive Air Emissions License #FF-01, the Hanford Site and REDOX specifically are licensed for airborne radioactive emissions. The #FF-01 license is issued by the Washington State Department of Health.

6.3 Recordkeeping/Documentation

Records and documents are maintained in accordance with DOE requirements.

6.4 Hazardous Material Management

The ARARs for management of hazardous materials are provided in Table 6-1. During the S&M program, the REDOX facility complies with the applicable requirements and as low as reasonably achievable (ALARA) considerations for control of potential personnel exposures to hazardous materials. Hazardous material protection requirements are accomplished by complying with the S&M contractor's safety and health procedures.

6.5 Other Requirements

Review of actions for potential to affect historical, cultural, or ecological resources will be conducted in accordance with Hanford Site processes. Institutional controls do not apply to activities addressed by the REDOX S&M plan because a CERCLA Record of Decision has not been issued. Once a CERCLA Record of Decision is issued for the REDOX facility, the identified institutional controls will be implemented as required. Site security and access control are implemented as part of S&M activities.

6.6 Applicable or Relevant and Appropriate Requirements

Substantive standards of promulgated regulations pertaining to REDOX S&M activities have been identified through the ARAR identification process of CERCLA Section 121(d), "Cleanup Standards, "Degree of Cleanup"; *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA/540/G-89/004); *CERCLA Compliance with Other Laws Manual: Interim Final* (EPA/540/G-89/006); and *CERCLA Compliance with Other Laws Manual: Part II* (EPA/540/G-89/009,). Table 6-1 presents the federal and Washington State ARARs for this action.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
Air					
"Washington Clean Air Act" (Chapter 70.94 RCW, as amended); "General Regulations for Air Pollution Sources" (WAC 173-400)					
"General Regulations for Air Pollution Sources" (WAC 173-400)	Action	Defines methods of control to be employed to minimize the release of air contaminants associated with fugitive emissions resulting from materials handling, construction, demolition, or other operations. Emissions are to be minimized through application of best available control technology.	S&M CERCLA actions implemented in REDOX have the potential to emit emissions subject to these standards because soil and groundwater hazardous contaminants detected in REDOX include covered hazardous air pollutants.	ARAR	S&M actions performed at REDOX that result in the emission of hazardous air pollutants, during a S&M action that have the potential to emit visible, particulate, fugitive, and hazardous air emissions and odors.
"General Standards for Maximum Emissions" (WAC 173-400-040)	Action	All sources and emission units are required to meet the general emission standards unless a specific source standard is available. General standards apply to visible emissions, particulate fallout, fugitive emissions, odors, emissions detrimental to health and property, sulfur dioxide, and fugitive dust.	S&M CERCLA actions implemented in REDOX have the potential to emit emissions subject to these standards because hazardous contaminants detected in REDOX include covered regulated hazardous air pollutants.	ARAR	REDOX S&M actions that have the potential to release hazardous air emissions.
"Emission Standards for Sources Emitting Hazardous Air Pollutants" (WAC 173-400-075)	Action	Establishes national emission standards for hazardous air pollutants. Adopts, by reference, "National Emission Standards for Hazardous Air Pollutants" (NESHAP [40 CFR 61]) and appendices.	Soil and/or groundwater hazardous contaminants detected in REDOX include covered regulated hazardous air pollutants.	ARAR	Actions performed at REDOX that result in the emission of hazardous air pollutants, during the S&M action that have the potential to emit visible, particulate, fugitive, and hazardous air emissions and odors.
"Washington Clean Air Act" (Chapter 70.94 RCW, as amended); "Controls for New Sources of Toxic Air Pollutants" (WAC 173-460)					
"Purpose" (WAC 173-460-010) "Applicability" (WAC 173-460-030) "Control Technology Requirements" (WAC 173-460-060) "Ambient Impact Requirement" (WAC 173-460-070) "First Tier Review" (WAC 173-460-080) "Table of ASIL, SQER and de Minimus Emission Values" (WAC 173-460-150)	Action	Establishes control of new sources emitting toxic air pollutants to prevent air pollution, reduce emissions to the extent reasonably possible, and maintain such levels of air quality as will protect human health and safety. Toxic air pollutants include carcinogens and noncarcinogens listed in "Table of ASIL, SQER and de Minimus Emission Values" (WAC 173-460-150). Three major requirements of this regulation are implementation of best available control technology for toxics, quantification of toxic air pollutant emissions, and demonstration of health and safety protection.	Hazardous contaminants detected within REDOX include constituents that would constitute toxic air pollutants if released to the air.	ARAR	REDOX S&M actions with the potential to emit hazardous air emissions would be considered a source.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Washington Clean Air Act" (Chapter 70.94 RCW, as amended); "Ambient Air Quality Standards and Emission Limits for Radionuclides" (WAC 173-480)					
"Ambient Standard" (WAC 173-480-040)	Action	Defines the maximum allowable level for radionuclides in the ambient air, which shall not cause a maximum accumulated dose equivalent of 25 mrem/yr to the whole body or 75 mrem/yr to any critical organ. However, ambient air standard under NESHAP "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (40 CFR 61, Subpart H), and "National Emission Standards for Radionuclide Emissions from Federal Facilities Other Than Nuclear Regulatory Commission Licensees and Not Covered by Subpart H" (40 CFR 61, Subpart I) are not to exceed amounts that result in an effective dose equivalent of 10 mrem/yr to any member of the public.	Hazardous contaminants detected within REDOX include radionuclides that could be emitted to ambient air during S&M actions.	ARAR	REDOX S&M actions have the potential to emit radionuclides above maximum acceptable levels.
"General Standards for Maximum Permissible Emissions" (WAC 173-480-050)	Action	At a minimum, all emission units shall make every reasonable effort to maintain radioactive materials in effluents to unrestricted areas; control equipment at sites operating under ALARA shall be defined as reasonably available control technology and as low as reasonably achievable control technology.	The potential for fugitive and diffuse emissions because of S&M activities will require efforts to minimize those emissions.	ARAR	REDOX S&M actions have the potential to emit radionuclides above maximum acceptable levels.
"Emission Monitoring and Compliance Procedures" (WAC 173-480-070)	Action	Requires that radionuclide emissions shall be determined by calculating the dose to members of the public using Department of Health approved sampling procedures at the point of maximum annual air concentration in an unrestricted area where any member of the public may be located.	Hazardous contaminants detected within REDOX include radionuclides that could be emitted to unrestricted areas during S&M actions.	ARAR	REDOX S&M actions have the potential to emit radionuclides to unrestricted areas above maximum acceptable levels.
"Emission Standards for New and Modified Emission Units" (WAC 173-480-060)	Action	Requires that construction, installation, or establishment of new air emission control units use best available radionuclide control technology.	Hazardous contaminants detected in soil and groundwater in REDOX includes radionuclides that could be emitted from air emission control units during S&M actions.	ARAR	REDOX S&M actions have the potential to emit radionuclides.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Nuclear Energy and Radiation" (RCW 70.98, as amended); "Radiation Protection—Air Emissions" (WAC 246-247)					
"National Standards Adopted by Reference for Sources of Radionuclide Emissions" (WAC 246-247-035[1][a][i]) (adopts by reference, "Prohibited Activities"[40 CFR 61.05])	Action	Identifies prohibition of any owner or operator of any stationary source subject to a national emission standard for hazardous air pollutants from constructing or operating the new or existing source in violation of any such standard.	Substantive requirements of this standard are applicable because the S&M actions in REDOX may be subject to NESHAP air pollutant standards, and resultant requirements have the potential to be detected in, and potentially emitted from, structures, components, debris, soil, or groundwater involved in the S&M action.	ARAR	S&M actions have the potential to emit radionuclides.
"National Standards Adopted by Reference for Sources of Radionuclide Emissions" (WAC 246-247-035[1][a][i]) (adopts by reference, "Compliance with Standards and Maintenance Requirements" [40 CFR 61.12])	Action	Requires the owner or operator of each stationary source of hazardous air pollutants subject to a national emission standard for a hazardous air pollutant to determine compliance with numerical emission limits in accordance with emission tests established in NESHAP "Emission Tests and Waiver of Emission Tests" (40 CFR 61.13) or as otherwise specified in an individual subpart. Compliance with design, equipment, work practice, or operational standards shall be determined as specified in the individual subpart. Also, maintain and operate the source, including associated equipment for air pollution control, in a manner consistent with good air pollution control practice for minimizing emissions.	Hazardous contaminants that would be subject to NESHAP air pollutant standards and resultant requirements have the potential to be detected in, and potentially emitted from, structures, components, debris, soil, or groundwater involved in the S&M actions in REDOX.	ARAR	S&M actions involve stationary sources that provide a potential to emit regulated hazardous air pollutants (e.g., vapor extraction systems, decontamination stations, deactivation, demolition, or waste removal or storage activities). Associated design, equipment, work practice, or air emissions controls may be maintained and operated.
"National Standards Adopted by Reference for Sources of Radionuclide Emissions" (WAC 246-247-035[1][a][i]) (adopts by reference, "Monitoring Requirements" [40 CFR 61.14])	Action	Requires the owner or operator to maintain and operate each monitoring system as specified in the applicable subpart, and in a manner consistent with good air pollution control practice for minimizing emissions. Approvals of alternatives to any monitoring requirements or procedures are obtained from the regulatory agency.	Hazardous contaminants that would be subject to NESHAP air pollutant standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the S&M actions in REDOX. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart.	ARAR	S&M actions may produce airborne emissions of hazardous pollutants to unrestricted areas.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"National Standards Adopted by Reference for Sources of Radionuclide Emissions" (WAC 246-247-035[1][a][ii]) (adopts by reference, "Standard" [40 CFR 61.92])	Chemical	Establishes emission standards for radionuclides equivalent to NESHAP "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities" (40 CFR 61, Subpart H), by reference. Hanford Site radionuclide airborne emissions shall be controlled so as not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent.	Hazardous radionuclide contaminants that would be subject to NESHAP radionuclide air pollutant standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil or groundwater involved in the S&M actions in REDOX.	ARAR	S&M actions may produce airborne emissions of hazardous radionuclide pollutants to unrestricted areas.
"National Standards Adopted by Reference for Sources of Radionuclide Emissions" (WAC 246-247-035[1][a][ii]) (adopts by reference, "Emission Monitoring and Test Procedures" [40 CFR 61.93])	Action	Specifies that radionuclide emissions shall be determined and effective dose equivalent values to members of the public calculated to determine compliance with the 10 mrem/yr effective dose equivalent standard. Radionuclide emissions shall be collected and measured using approved methods. A quality assurance program shall be conducted that meets the performance requirements described in Appendix B, Method 114. Measurement by methods specified in the paragraph (b) shall be made at all release points that have the potential to discharge radionuclides to the air in quantities that cause an effective dose equivalent in excess of 1 percent of the 10 mrem/yr standard. For other release points that have a potential to release radionuclides into the air, periodic confirmatory measurements shall be made to verify the low emissions.	Hazardous radionuclide contaminants that would be subject to NESHAP radionuclide air pollutant standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the S&M actions in REDOX. The hazardous contaminants will be monitored as identified under each applicable NESHAP subpart.	ARAR	S&M actions produce airborne emissions of hazardous radionuclide pollutants to unrestricted areas.
"General Standards" (WAC 246-247-040[3]) "General Standards" (WAC 246-247-040[4])	Action	Requires that emissions be controlled to ensure ALARA-based and best available control standards are not exceeded.	Hazardous contaminants that would be subject to radionuclide air emission standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the S&M actions in REDOX.	ARAR	S&M actions may produce airborne emissions of hazardous radionuclide pollutants to unrestricted areas.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Monitoring, Testing and Quality Assurance" (WAC 246-247-075)	Action	Establishes the monitoring, testing, and quality assurance requirements for radioactive air emissions. Emissions from nonpoint and fugitive sources of airborne radioactive material will be measured. Measurement techniques may include but are not limited to sampling, calculation, smears, or other reasonable method for identifying emissions as determined by the lead agency.	Hazardous contaminants at REDOX waste sites that would be subject to radionuclide air emission standards and resultant requirements have the potential to be detected in, and emitted from, structures, components, debris, soil, or groundwater involved in the S&M actions.	ARAR	S&M actions may produce airborne emissions of hazardous radionuclide pollutants to unrestricted areas.
***Clean Air Act of 1990* and amendments; "National Emission Standard for Asbestos" (40 CFR 61, Subpart M)**					
"Applicability" (40 CFR 61.140) "Standard for Demolition and Renovation" (40 CFR 61.145)	Action	Defines regulated ACM and regulated removal and handling requirements. Specifies sampling, inspection, handling, and disposal requirements for regulated sources having the potential to emit asbestos. Specifically, no visible emissions are allowed during handling, packaging, and transport of ACM.	Encountering ACM on pipelines or buried asbestos within the REDOX area is possible during the during remediation activities.	ARAR	S&M actions may include demolition and/or renovation and associated handling, packaging, and transportation of ACM, including IDW management and disposal.
"Standard for Waste Disposal for Manufacturing, Fabricating, Demolition, Renovation, and Spraying Operations" (40 CFR 61.150)	Action	Identifies requirements for the removal and disposal of asbestos from demolition and renovation activities.	Encountering ACM on pipelines or buried asbestos within the REDOX area is possible during the during remediation activities.	ARAR	S&M actions may include demolition and/or renovation and associated handling, packaging, and transportation of ACM including IDW management and disposal.
Solid Wastes –Polychlorinated Biphenyls					
***Toxic Substances Control Act of 1976* (Public Law 107-377, as amended; 15 USC Section 2605, et seq.); "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions" (40 CFR 761)**					
"Applicability," "PCB Waste" (40 CFR 761.50[b]1, 2, 3, 4 and 7) "Applicability," "Storage for Disposal" (40 CFR 761.50[c])	Action	Establishes general PCB disposal requirements for the storage and disposal of PCB wastes including liquid PCB wastes, PCB items, PCB remediation waste, PCB bulk product wastes, and PCB/radioactive wastes at concentrations greater than 50 ppm.	PCB wastes encountered and or generated during the remediation of REDOX.	ARAR	S&M actions may include PCB waste generation and management.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Disposal Requirements," "PCB Liquids" (40 CFR 761.60[a]) "Disposal Requirements," "PCB Articles" (40 CFR 761.60[b]) "Disposal Requirements," "PCB Containers" (40 CFR 761.60[c])	Action	Establishes requirements applicable to the handling and disposal of PCB liquids, PCB articles, and PCB containers.	PCB liquids, articles, and/or containers encountered and/or generated during the S&M actions for REDOX.	ARAR	S&M actions may include PCB waste generation and management.
Solid Wastes – Dangerous Wastes					
"Hazardous Waste Management" (RCW 70.105, as amended); "Dangerous Waste Regulations" (WAC 173-303)					
"Identifying Solid Waste" (WAC 173-303-016) "Recycling Processes Involving Solid Waste" (WAC 173-303-017)	Action	Establishes criteria for solid and recycled solid wastes.	Solid wastes and/or recycled solid wastes will be generated during REDOX S&M actions.	ARAR	S&M action may include dangerous waste generation and management.
"Designation of Dangerous Waste" (WAC 173-303-070)	Action	Establishes the method for determining if a solid waste is a dangerous waste (or an extremely hazardous waste).	Dangerous/hazardous waste will be generated during REDOX S&M actions.	ARAR	S&M action may include dangerous waste generation and management.
"Conditional Exclusion of Special Wastes" (WAC 173-303-073)	Action	Establishes the conditional exclusion and the management requirements of special wastes, as defined in "Definitions" (WAC 173-303-040).	Special wastes have the potential to be generated during REDOX S&M actions.	ARAR	S&M action may include dangerous waste generation and management.
"Requirements for Universal Waste" (WAC 173-303-077)	Action	Identifies those wastes exempted from regulation under "Land Disposal Restrictions" (WAC 173-303-140) and "Requirements for Generators of Dangerous Waste" (WAC 173-303-170) through "Reserved" (WAC 173-303-9907) (excluding, "Special Powers and Authorities of the Department" [WAC 173-303-960]). These wastes are subject to regulation under "Standards for Universal Waste Management" (WAC 173-303-573).	Universal wastes have the potential to be generated during the REDOX S&M actions.	ARAR	S&M action may include dangerous waste generation and management.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Recycled, Reclaimed, and Recovered Wastes" (WAC 173-303-120) "Recycled, Reclaimed, and Recovered Wastes" (WAC 173-303-120[3]) "Recycled, Reclaimed, and Recovered Wastes" (WAC 173-303-120[5])	Action	Defines the requirements for the recycling of materials that are solid and dangerous waste. Specifically, "Recycled, Reclaimed, and Recovered Wastes" (WAC 173-303-120[3]) provides for the management of certain recyclable materials, including spent refrigerants, antifreeze, and lead acid batteries. "Recycled, Reclaimed, and Recovered Wastes" (WAC 173-303-120[5]) provides for the recycling of used oil.	Recycled, reclaimed, and recovered wastes have the potential to be generated during REDOX S&M actions.	ARAR	S&M action may include dangerous waste generation and management.
"Land Disposal Restrictions" (WAC 173-303-140)	Action	Establishes treatment requirements and disposal prohibitions for land disposal of dangerous waste and incorporates by reference "Land Disposal Restrictions" (WAC 173-303-140[2][a]), and the federal land disposal restrictions of "Land Disposal Restrictions" (40 CFR 268) that are applicable to solid waste that is a dangerous or mixed waste in accordance with "Designation of Dangerous Waste" (WAC 173-303-070[3]).	Onsite land disposal at ERDF may be a component of the selected remedy for REDOX dangerous waste and debris.	ARAR	S&M action may include dangerous waste generation and management.
"Requirements for Generators of Dangerous Waste" (WAC 173-303-170)	Action	Establishes the requirements for dangerous waste generators. "Requirements for Generators of Dangerous Waste" (WAC 173-303-170[3]) includes the substantive provisions of "Accumulating Dangerous Waste On-Site" (WAC 173-303-200) by reference. "Accumulating Dangerous Waste On-Site" (WAC 173-303-200) further includes certain substantive standards from "Use and Management of Containers" (WAC 173-303-630) and "Tank Systems" (WAC 173-303-640) by reference. Specifically, the substantive standards for management of dangerous/mixed waste are applicable to the management of dangerous waste that will be generated during the S&M action.	Dangerous wastes will be generated from the S&M actions in REDOX.	ARAR	S&M action may include dangerous waste generation and management.
"Accumulating Dangerous Waste On-Site" (WAC 173-303-200)	Action	Establishes the requirements for accumulating wastes onsite. "Accumulating Dangerous Waste On-Site" (WAC 173-303-200) further includes certain substantive standards from "Use and Management of Containers (WAC 173-303-630) and "Tank Systems" (WAC 173-303-640) by reference.	Dangerous waste will be generated from the S&M actions in REDOX.	ARAR	S&M action may include dangerous waste generation and management.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
"Solid Waste Management—Reduction and Recycling" (RCW 70.95, as amended); "Solid Waste Handling Standards" (WAC 173-350)					
"Owner Responsibilities for Solid Waste (WAC 173-350-025) "Performance Standards" (WAC 173-350-040) "On-Site Storage, Collection and Transportation Standards" (WAC 173-350-300) "Remedial Action" (WAC 173-350-900)	Action	Establishes minimum functional performance standards for the proper handling and disposal of solid waste. Details requirements for the proper handling of solid waste materials originating from residences, commercial, agricultural and industrial operations, and other sources, and identifies those functions necessary to ensure effective solid waste handling programs at both the state and local level.	Solid, nondangerous waste will be generated during implementation of REDOX S&M actions.	ARAR	S&M action may include solid waste generation and management.
Historical and Archeological Resources					
***National Historic Preservation Act of 1966* (Public Law 89-665, as amended, 16 USC 470, et seq.)**					
"Protection of Historic Properties" (36 CFR 800)	Location	Legislation intended to preserve historical and archaeological sites in the United States. Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation, mitigation processes, and consultation with interested parties.	Cultural and historic sites have been identified within REDOX.	ARAR	S&M actions may involve cultural and historical sites.
***Protection and Enhancement of the Cultural Environment* (Executive Order 11593)**					
"National Historic Landmarks Program" (36 CFR 65) "National Register of Historic Places" (36 CFR 60)	Location	Requires federal agencies to consider the impacts of their undertaking on cultural properties through identification, evaluation, mitigation processes, and consultation with interested parties.	Cultural and historic sites have been identified within REDOX.	ARAR	S&M actions may involve cultural and historical sites.
***Archeological and Historic Preservation Act of 1974* (Public Law 93-291, as amended; 16 USC 469a-1 through 469a-2[d])**					
"Applicant Requirements" 16 USC 469a-1 through 469a-2(d)	Location	Requires that actions do not cause the loss of any archaeological or historic data. This act mandates preservation of the data; it does not require protection of the actual waste site or facility.	Archaeological and historic sites have been identified within REDOX.	ARAR	S&M actions may involve archeological or historical sites.

Table 6-1. Federal and Washington State ARARs for S&M Activities

Regulatory Citation	ARAR Category	Description of Regulatory Requirement	Rationale for Including	Relevancy	Application
Natural and Ecological Resources					
***Endangered Species Act of 1973* (Public Law 93-205, as amended; 7 USC Section 136; 16 USC Ch. 1531, et seq.)**					
"Interagency Cooperation—Endangered Species Act of 1973, as amended" (50 CFR 402)	Location	Prohibits actions by federal agencies that are likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of habitat critical to them. Mitigation measures must be applied to actions that occur within critical habitats or surrounding buffer zones of listed species, in order to protect the resource.	Federal endangered and/or threatened species including fish, plants, and animals are found within REDOX.	ARAR	S&M actions may occur within critical habitats or designated buffer zones of federal listed species.
***Migratory Bird Treaty Act of 1918* (16 USC 703-712; Ch. 128; July 13, 1918; 40 Stat. 755), as amended**					
Migratory Bird Treaty Act of 1918 (16 USC 703-712)	Location	Protects all migratory bird species and prevents "take" of protected migratory birds, their young, or their eggs."	Migratory birds occur in REDOX.	ARAR	S&M actions may require mitigation measures to deter nesting by migratory birds on, around, or within S&M action site and methods to identify and protect occupied bird nests.

ACM = asbestos-containing material
ALARA = as low as reasonably achievable
ARAR = applicable or relevant and appropriate requirement
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
IDW = investigation-derived waste
PCB = polychlorinated biphenyl
ppm = parts per million
REDOX = Reduction-Oxidation (facility)
S&M = surveillance and maintenance

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7 Occupational Radiological Controls

This chapter provides reference to the DOE ALARA policy and program, which includes, but is not limited to, the following:

- External radiation exposure control
- External dosimetry
- Internal radiation exposure control
- Internal dosimetry
- Radiological protection instrumentation programs (both calibration and use)
- Respiratory protection program
- Air monitoring
- Radiological monitoring and contamination control
- Radiological protection recordkeeping
- Radiological area boundaries, posting, and controls
- Radiological protection training
- Entry and exit control program

The DOE requires the S&M contractor to establish, implement, and maintain a radiation protection program that satisfies the minimum requirements established by 10 CFR 835, "Occupational Radiation Protection."

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8 Emergency Management

This chapter describes the DOE philosophy, objectives, and organization of the emergency preparedness functions for a spectrum of emergencies ranging from local area emergencies to those that could affect individuals offsite. This chapter also addresses the activation of emergency organizations, assessment actions, notification processes, emergency facilities and equipment, training and exercises, and recovery actions.

The DOE requires the S&M contractor to comply with CRD O 151.1C, *Comprehensive Emergency Management System*. If an emergency or abnormal incident occurs, the situation will be responded to in accordance with the current revision of the *Hanford Emergency Response Plan* (DOE/RL-94-02) and *Emergency Plan Implementing Procedures* (DOE-0223), which establish the emergency preparedness requirements for the Hanford Site. The REDOX-specific building emergency plan is written to meet a variety of requirements. Personnel are trained ahead of time to deal with emergencies or abnormal incidents through formal classroom instruction and drills.

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9 Health and Safety

This chapter discusses the DOE activities to ensure the health and safety of the workforce. Other topical areas such as radiological controls and facility maintenance may be driven by health and safety requirements; therefore, health and safety are discussed throughout the plan.

9.1 Fire Hazard Analysis

The DOE requires the S&M contractor to establish requirements for the preparation, maintenance, and approval of a fire hazards analysis that comprehensively assesses the risk from fire within a DOE facility to determine whether the fire protection objectives of CRD O 420.1C (Supp. Rev. 0), *Facility Safety*, are met.

9.2 Occupational Safety and Health

The DOE requires the S&M contractor to comply with applicable Occupational Safety and Health Administration standards in accordance with 10 CFR 851, "Worker Safety and Health Program." Applicability of the 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER) standards and the need for HAZWOPER training will be determined based on RL guidance. A health and safety plan has been developed for S&M work activities at REDOX.

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10 Safeguards and Security

The DOE requires the S&M contractor as the facility manager/asset owner to ensure that protection is provided for all property, facilities, and materials according to the provisions of CRD O 473.3 (Supp. Rev. 0), *Protection Program Operations*. This directive for controlling access to the facility provides for an evaluation of the adequacy of existing physical controls (e.g., fencing, signs, entrance points into exclusion areas, door locks, and other barriers), provides a plan for the placement and monitoring of intrusion alarms, and describes the duties and scheduling of security patrols.

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11 Cost and Schedule

This chapter identifies the DOE cost and schedule of S&M activities. One surveillance, at a minimum, will be made each year. The frequency of routine S&M, as identified in Chapter 3 of this plan, is identified in the S&M contractor's work and maintenance procedures. For a perspective of the annual S&M costs, in the 12-month period for fiscal year 2013, the S&M cost associated with REDOX was approximately $277,000, which is anticipated to increase each year due to the age of the facility and the need to keep the facility in a condition that is protective of public health and the environment while awaiting demolition.

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40 CFR 61.13, "Emission Tests and Waiver of Emission Tests."

40 CFR 61.14, "Monitoring Requirements."

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Appendix A

Hazardous Material Remaining at the REDOX Facility

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A1 Introduction

The list of hazardous materials remaining at the Reduction-Oxidation (REDOX) facility is as complete as knowledge allows. However, the list was not developed at the time the facility was deactivated by personnel who worked at and deactivated the facility.

A2 Hazardous Chemical and Toxic Material

Exposure to hazardous chemicals at the REDOX facility was rated as "low to negligible" in a risk management study of Hanford Site surplus facilities. The study identified loose containerized chemicals, lead shielding and counterweights, deteriorating and flaking lead-based paints, mercury switches, and fluid-filled manometers present inside facility buildings and surrounding grounds. Polychlorinated biphenyls (PCBs) light ballast, lead paint, lead material used for shielding, mercury in switches and in lights, and used oils may also be encountered during the conduct of S&M activities.

While deactivation activities removed a vast majority of the chemicals, minor quantities of residual chemicals are expected to be found in the process vessels and piping located in the various buildings throughout the facility. Deactivation procedures specified the use of nitric acid, permanganate, and oxalic acid that are also likely to be present in residual quantities.

A3 Radiological Materials

The majority of the radiological inventory at the REDOX facility is located within the cells of the canyon in the 202-S Building and the 291-S exhaust system duct work and sand filter. Relatively minor quantities exist in other buildings, typically as residues or surface contamination. The table below presents the inventory of the 202-S Canyon Building and sand filter. The values are based on the best available data. For radiological consequence calculation purposes, the alpha activity is assumed to be plutonium-239, and the beta activity is assumed to be strontium-90. These assumptions are conservative in that plutonium-239 and strontium-90 have the largest effective dose conversion factors of those radionuclides potentially present in significant quantities.

Table A-1. Hazardous Material Retaining at the REDOX Facility

Location	Source Document	Material Description	Quantity/State
General		This General section addresses hazardous substances/ dangerous wastes that may not have been specifically addressed in the deactivation process. Traces of the following materials, which are expected to remain stable during surveillance and maintenance (S&M), may exist in unknown quantities throughout the facility, as noted below: • Asbestos abandoned throughout the plant as a solid component such as transit siding, utility line insulation, floor tiles, and gasket material. • Lead as a solid component, such as paint, light bulb contacts, washers affixing transit, solder in electrical and plumbing system sanitary water line joints packed with lead mesh; steam, air and water safety relief valve seals; components of control panels-all abandoned in place and stable during S&M. • Mercury in thermostats and in electronic switches (i.e., electronic switches) throughout the facility. • Remaining smoke detectors may contain radioactive sources. • PCBs may exist in ballasts and lubricants/gear oil once used throughout the plant • Organic in liquid films, greases, and solid residues in bearings and gearboxes throughout the plant. • Silver and lead contacts are used in the electrical system. Lead and zinc were used as soldering in the electrical systems.	
202-S Canyon Building	SD-DD-001 (RHO 1982)	• 1,500 Ci alpha (24,500 g of ^{239}Pu) • 9,000 Ci beta (64 g of ^{90}Sr)	Based on historical published data, the basis of which is unknown. No location specified. Assumed distributed about the facility. Primarily concentrated in the canyon process cells, silo, and processing equipment.

Table A-1. Hazardous Material Retaining at the REDOX Facility

Location	Source Document	Material Description	Quantity/State
202-S North Sample Gallery		• 40 Ci alpha (2,155 g of ^{239}Pu) • 840 Ci beta (6.0 g of ^{90}Sr)	• H-4 transfer line (488 ft) 45.4 g 0.049 Ci • E-3 to L-12 XFR line (29ft) 0.8 0.05 • 233-S Flr Drn Line (26ft) 2.0 0.12 • 233-S Pipe Trench Line (10ft) 0.6 0.04 • PR Cage Sump (6x6x6 in) 5.9 0.36 • E-16 Pre-Concentrator 1,450.0 88.9 • E-17 Concentrator 650.0 40.0 Total 2,155 g 132.1 Ci Source: BHI-00994 (BHI 1997). Uncertainty is approximately +/- 10%. The 132.1 Ci of ^{239}Pu is assumed to be 140 for conservatism. BHI-01142, *REDOX Safety Analysis Report* (BHI 1998) Source for fissionable material in the 202-S Sample Galleries)

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Appendix B

REDOX Waste Control Plan

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Attachment

CERCLA Waste Management Area Inspection Checklist B-12

Terms

AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
DOT	U.S. Department of Transportation
ERDF	Environmental Restoration Disposal Facility
ESD	Explanation of Significant Differences
HHE	human health and the environment
LDR	land disposal restriction
LLW	low-level waste
NA	not applicable
NESHAP	"National Emission Standards for Hazardous Air Pollutants" (40 CFR 61)
PCB	polychlorinated biphenyl
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction-Oxidation (facility)
S&M	surveillance and maintenance

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B1 Introduction

This plan outlines the waste management practices that will be performed during implementation of the surveillance and maintenance (S&M) activities for the Reduction-Oxidation (REDOX) facility. Management and disposal of S&M action wastes will be performed in accordance with the state and federal applicable or relevant and appropriate requirements (ARARs).

B2 Waste Streams

Waste associated with S&M of REDOX will be dispositioned via the ARARs identified in Table 6-1 of this S&M plan. For purposes of this waste control plan, legacy hazardous substances within REDOX become wastes when actions are taken to manage them. For example, during S&M, a facility component may be removed, modified, decontaminated, or sampled. Wastes generated during S&M, including those generated during associated actions such as deactivation and decontamination will be managed in accordance with this plan unless the wastes are generated by an S&M or response action more specifically associated with the waste.

Implementation of the S&M action may generate solid, dangerous, radioactive, polychlorinated biphenyl (PCB), and/or mixed wastes. The wastes will be evaluated and managed to comply with the waste management ARARs. The Environmental Restoration Disposal Facility (ERDF) is considered to be onsite for the purposes of the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) for management and/or disposal of waste from this S&M action. The majority of waste will be disposed of at ERDF in accordance with current *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (WCH-191). Waste will be shipped either in containers or in plastic wrapped bulk shipments, depending on the characteristics of the waste matrix. The wastes are characterized in accordance with Section B3 and managed in accordance with applicable requirements as further defined in Section B4.

B3 Waste Characterization and Designation

Waste generated will be characterized in accordance with internal work requirements and the requirements of the receiving facility. Waste profiles and designations will be developed on an as-needed basis throughout implementation of the CERCLA S&M action. Characterization will be conducted through process knowledge, sampling/analysis, and radiological surveys to support waste designation and disposal decisions. The characterization data will be used to prepare waste profile summaries for evaluations against waste acceptance criteria to determine appropriate disposal options.

B4 Waste Management (General)

A variety of waste types may be generated during implementation of S&M action activities. The processes for handling the most common types are described in this section. These wastes will be managed in accordance with the substantive requirements of ARARs for waste management identified in Table 6-1 in the main text of the S&M plan. The waste will be managed, as appropriate, for the nonradiological and radiological contaminants present or suspected to be present, if any. The majority of wastes will be disposed at ERDF. Waste designated as dangerous or mixed waste would be treated, as appropriate, to meet land disposal restrictions (LDRs) and ERDF acceptance criteria prior to disposal at ERDF. The ERDF is an engineered facility that provides a high degree of protection to human health and the environment (HHE) and meets *Resource Conservation and Recovery Act of 1976* (RCRA) minimum technical requirements for landfills, including standards for a double-liner leachate collection system, leak

detection, monitoring, and final cover. ERDF is considered onsite for purposes of managing waste within the scope of this waste control plan.[1] ERDF is eligible for disposal of any low-level waste (LLW), mixed waste, and hazardous/dangerous waste generated as a result of cleanup actions (e.g., S&M action waste and investigation-derived waste), provided the waste meets ERDF waste acceptance criteria and appropriate CERCLA decision documents are in place. For example, CERCLA coverage for general S&M waste may be provided by this S&M plan. System components and other wastes identified in Table 1 of the ERDF Record of Decision amendment (*U.S. Department of Energy Environmental Restoration Disposal Facility Hanford Site – 200 Area Benton County, Washington Amended Record of Decision, Decision Summary and Responsiveness Summary* [EPA et al., 2007]) may be covered by that document.

Wastes will be shipped either in containers or in bulk shipments, depending on the characteristics of the waste matrix. The wastes will be packaged and may be accumulated within the REDOX CERCLA area of contamination (AOC), as depicted in the S&M plan, until shipped. As needed, the wastes may also be consolidated within the AOC or at a CERCLA waste consolidation area located at 224-T in the 200 West Area. If the wastes are not acceptable for management at ERDF, they may be sent to alternate onsite or offsite waste treatment or disposal facilities that meet 40 CFR 300.440, "National Oil and Hazardous Substances Pollution Contingency Plan," "Procedures for Planning and Implementing Off-Site Response Actions," criteria. U.S. Environmental Protection Agency (EPA) approval of the offsite treatment, storage, and/or disposal facility to manage CERCLA waste will be obtained prior to shipment of the waste.

Applicable packaging and pre-transportation requirements for dangerous or mixed waste will be identified and implemented before movement of the waste from the AOC or CERCLA onsite boundary. Marking, labeling, segregating, and staging of waste containers will be performed or directed by a waste management specialist.

The following are the types of waste expected to be encountered during S&M activities.

B4.1 Low-Level Radioactive Waste

The LLW will be managed under U.S. Department of Energy (DOE) implementation of the *Atomic Energy Act of 1954*. This waste stream is radioactively contaminated waste that does not designate as dangerous waste under RCRA, PCB waste under the *Toxic Substances Control Act of 1976*, or asbestos waste under 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" (hereafter called NESHAP). Management of LLW is based on pertinent DOE orders. This type of waste stream typically includes step-off pad wastes, personal protective equipment, soft waste, decontamination waste, process items that have been partially decontaminated, and waste packages. These waste streams will be mainly solid in form, although some liquid and sludge waste may be generated during the S&M activities.

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[1] CERCLA Section 104(d)(4) states "...where two or more noncontiguous facilities are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, the President may, at his discretion, treat these facilities as one." The preamble to 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," clarifies the stated EPA interpretation that when noncontiguous facilities are reasonably close to one another, and wastes at these sites are compatible for a selected treatment or disposal approach, CERCLA Section 104(d)(4) allows the lead agency to treat these related facilities as one for response purposes. This allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. ERDF is considered to be onsite for response purposes under this S&M activity. It should be noted that the scope of work covered in this S&M activity is for a facility and waste contaminated with hazardous substances. Materials encountered during implementation of the selected S&M activity that are not contaminated with hazardous substances will be dispositioned by DOE.

The containers will be segregated as appropriate for staging at the designated waste container storage area of within the AOC boundary.

B4.2 Miscellaneous Solid Waste

Miscellaneous solid waste will be managed, as appropriate, under the solid waste ARARs, WAC 173-350. Miscellaneous solid waste will also be evaluated and if designated as radioactive, PCB, asbestos-regulated, dangerous, or mixed waste, it will be managed as such. Field screening will be used to segregate radioactive waste from no radiation added (nonradioactive) waste. Container(s) will be properly marked and labeled. The containers will be segregated, as appropriate, for staging at the designated waste container storage area or within the AOC boundary. Miscellaneous solid waste will be dispositioned based on waste characterization information.

If the waste is demonstrated to be volumetrically free of residual radioactive contamination, it will be sent offsite for disposal to an approved municipal/industrial landfill. Disposal of materials containing no or de minimus levels of CERCLA hazardous substances would not require an offsite acceptability determination by EPA. If the solid waste cannot be volumetrically free released, the waste will be disposed of at ERDF or another facility authorized to manage radioactive waste.

B4.3 Dangerous Waste and Mixed Waste

Dangerous waste includes listed, characteristic, and criteria wastes as described in WAC 173-303, "Dangerous Waste Regulations" (the term dangerous waste includes hazardous waste as defined in federal hazardous waste regulations). The dangerous waste substantive standards for generation and storage will apply to management of dangerous waste generated during S&M and other S&M investigation actions. Treatment standards for dangerous waste that is subject to LDRs are specified in WAC 173-303-140, "Land Disposal Restrictions," which incorporates 40 CFR 268, "Land Disposal Restrictions," by reference. Universal wastes that are not radiologically contaminated may be managed in accordance with Hanford Site processes for such waste.

B4.4 Asbestos Waste

Removal and disposal of asbestos and asbestos-containing material are regulated under the *Clean Air Act of 1990* and NESHAP (40 CFR 61, Subpart M, "National Emission Standards for Asbestos"). Management and disposal of asbestos-containing material generated during activities described in this S&M plan will be in accordance with the substantive requirements of 40 CFR 61.150.

B4.5 Polychlorinated Biphenyl Waste

The ARARs for management of PCB waste are derived from the substantive provisions of 40 CFR 761. Paint used to coat many of the facilities' interior surfaces (e.g., walls and ceilings) may contain regulated levels of PCBs. Light ballasts and other equipment may also contain some level of PCBs. Consequently, some of the waste streams discussed may also be contaminated with PCBs.

B5 Waste Minimization and Recycling

Waste minimization practices will be followed to the extent technically and economically feasible during waste management. Introduction of clean materials into a contamination area, as well as contamination of clean materials, will be minimized to the extent practicable. Emphasis will be placed on source reduction to eliminate or minimize the volume of waste generated.

Materials released offsite for disposal/recycle must be certified free of radioactive contamination in accordance with DOE guidance for nonreal property. Recyclable materials meeting this criterion will be managed in accordance with applicable regulatory requirements for such materials and will not be considered CERCLA waste. Therefore, offsite acceptability determinations under 40 CFR 300.440 will not be required.

B6 Inspection of RCRA Treatment, Storage, and Disposal Unit

This section is not applicable to REDOX as it does not contain any RCRA treatment, storage, and disposal units.

B7 Waste Handling, Storage, and Inspection

Wastes generated from implementation of the REDOX S&M plan will be placed in designated areas identified by signs reading "CERCLA WASTE MANAGEMENT AREA," or similar verbiage. Incompatible wastes will be separated within the designated waste management areas to prevent commingling of the wastes.

Wastes will be packaged in a manner to ensure that the materials are compatible with the packaging. If the waste has free liquids, secondary containment will be provided. Qualified personnel will inspect waste containers as they are filled initially to verify the following:

1. The container is in good condition and compatible with the waste.
2. Any waste treatment necessary for safe storage (e.g., neutralization) has been fully performed and successful.
3. The waste contains no free liquids or if liquids are present, appropriate controls such as secondary containment are in place.
4. The container is marked as "CERCLA waste."
5. The container is marked per the ARARs associated with the waste (e.g., major risk(s) marking for dangerous or mixed waste, PCB mark for PCB waste, and radioactive material markings for radioactive waste).
6. The container is closed and secured after adding or removing waste.
7. Labels are visible and readable.

Upon meeting these standards, the waste will be inspected on the frequency identified in Tables B7-1 and B7-2 using the Attachment 1 checklist or similar tool. Table B7-1 identifies the inspection frequency for containerized wastes inside the 202-S Building. This frequency is protective of HHE because the waste is packaged in the prescribed manner and stored in the 202-S Building so as to be protected from environmental degradation.

Table B7-2 identifies the inspection frequency for waste storage locations for newly generated waste that are not in the specified Tier 1 buildings. Radioactive waste will be inspected on an annual basis. This waste is packaged and stored in the prescribed manner, and an annual inspection is protective of HHE. A weekly inspection frequency is identified for waste containers with free liquids present that are hazardous/dangerous waste and mixed waste. The weekly frequency of inspections for this waste with liquids is consistent with the administrative RCRA requirements that are protective of HHE. A monthly inspection will be conducted for waste containers that are identified as hazardous/dangerous waste and

mixed waste (solids only), asbestos waste, and PCB waste. This monthly frequency is protective of HHE because the waste is packaged in the prescribed manner and stored in a designated CERCLA waste storage area.

Table B7-1. Waste Inspection Frequency for Newly Generated Waste Stored in 202-S

Type of Waste	Inspection Frequency
Radioactive Waste	Annually
Miscellaneous Solid Waste	N/A
Hazardous/Dangerous Waste and Mixed Waste	Annually
Asbestos Waste	Annually
PCB Waste	Annually

N/A = not applicable

Table B7-2. Waste Inspection Frequency for Wastes Stored in Locations Other Than 202-S

Type of Waste	Inspection Frequency
Radioactive Waste	Annually
Miscellaneous Solid Waste	N/A
Hazardous/Dangerous Waste and Mixed Waste (Free Liquids Present)	Weekly
Hazardous/Dangerous Waste and Mixed Waste (Solids Only)	Monthly
Asbestos Waste	Monthly
Polychlorinated Biphenyl Waste	Monthly

N/A = not applicable

B8 Waste Packaging and Transportation

Before transport of regulated wastes off the AOC or CERCLA onsite boundary, the waste containers must be properly packaged, marked, labeled, and in proper condition for transport. As the containers are exiting the CERCLA area, the applicable contractor procedures for waste packaging and transportation will be implemented. Shipments will be made in accordance with applicable U.S. Department of Transportation regulations, 49 CFR 171, "Transportation," "General Information, Regulations, and Definitions," through 49 CFR 179, "Specifications for Tank Cars;" applicable sections of WAC 173-303; and the contractor's waste transportation procedures.

B8.1 Packaging

Regulated waste from CERCLA activities will be contained in the following types of packages or will use equivalent approved packaging guidelines for Hanford onsite shipments:

- Strong, tight packaging
- Industrial packaging
- Type A packaging (designed to survive normal transportation handling and minor accidents)
- Type B packaging (designed to survive severe accidents)

Contaminated soil and rubble that can be characterized as LLW can be shipped in bulk to ERDF. This conveyance uses roll-off/roll-on containers that will have liners. Trailer units will be equipped with tarping. If needed, other approved packages (e.g., burial boxes and/or sea-land containers) may be used for bulk, low-specific activity shipments.

Waste not appropriate for bulk shipment (e.g., piping, transfer columns, and other processing equipment) will be physically cut to size, packaged, and shipped in nonbulk containers to meet the appropriate facility's waste acceptance criteria.

Containers will be properly closed and if Type A packaging is used, a seal will be affixed (49 CFR 173.412[a], "Shippers—General Requirements for Shipments and Packagings," "Additional Design Requirements for Type A Packages"). The containers are visually inspected for leaks or other damage before the waste is transported. The container markings and labeling will be completed under the direction of qualified personnel.

B8.2 Shipping Paperwork

The appropriate shipping paperwork will be prepared for each waste shipment. A tracking form will be completed for each waste shipment destined for ERDF. The completed tracking form will be used as the basic shipping document and must accompany the shipment when the waste is sent to ERDF. Emergency response information will be attached to the tracking form. The original Onsite Waste Tracking Forms will be sent to ERDF with each container shipped. Original sample reports and a copy of the original Onsite Waste Tracking Form for each ERDF container will be retained and forwarded to the assigned waste specialist for inclusion in the project file following final waste disposition.

B9 Waste Treatment

Treatment (e.g., solidification, separation, elementary neutralization, mercury amalgamation, size reduction, and repackaging) of certain waste streams may be necessary to provide safe transport, meet waste disposal facility waste acceptance criteria, and/or address LDR standards. When necessary, treatment may be conducted at the generating site, ERDF, or an EPA approved offsite facility (e.g., Effluent Treatment Facility). Offsite treatment must be performed at a facility approved by the EPA in accordance with 40 CFR 300.440. Return of treated waste from offsite treatment facilities for disposal at ERDF requires DOE authorization.

B9.1 Solidification

Solidification is a technique that physically limits the mobility of dangerous waste by reducing or eliminating free liquids in the waste. The following criteria apply to meet treatment by solidification:

- The solidified waste must meet the Paint Filter Liquids Test, specified as Method 9095 of SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition; Final Update IV-B*, for assessing the amount of free liquid in the waste. The Waste Specialist or designee must ensure that the solidification technique used can solidify all waste in the container or tank to this standard. In most cases, this will mean ensuring adequate mixing of the waste with the solidification material.
- The waste must be solidified using a nonbiodegradable solidification material.

B9.2 Separation

Separation through decanting (solid-liquid systems) is the process of actively separating materials by utilizing differing specific gravities. The clarified supernatant is removed, and the solids are preferentially concentrated in a smaller fraction of the liquid. Separation through sedimentation or clarification is the settling out by gravity of solid particles suspended in a liquid. Separation through oil skimming or phase separation is the equivalent of decanting, but for liquid-liquid systems where the liquid phases are immiscible and/or have differing specific gravities.

The following criteria apply to meet treatment by separation:

- Ignitable or reactive waste treatment in tanks must comply with WAC 173-303-640(9)(a), "Tank Systems."
- No processes that generate toxic or flammable gasses or volatilize dangerous waste materials directly to the air may be used.

B9.3 Elementary Neutralization

Elementary neutralization is the process of neutralizing wastes that are dangerous because they exhibit the characteristic of corrosivity as defined by one or more of the following properties:

- Aqueous waste with a pH less than or equal to 2, or greater than or equal to 12.5
- Liquid that corrodes steel at rates and under conditions specified in WAC 173-303-090(6)(ii), "Dangerous Waste Characteristics"
- Solid waste that when mixed with an equal weight of water results in a solution, the liquid portion of which has either a pH less than or equal to 2, or greater than or equal to 12.5

The following criteria apply to meet treatment by elementary neutralization:

- Elementary neutralization must be conducted in accumulation tanks or containers.
- The treatment residuals must exhibit either: a) a pH of greater than 2 and less than 12.5 prior to onsite management or disposal, or b) its pH must meet the requirements of a delegated municipality or local solid waste authority.
- Elementary neutralization must not pose a risk to HHE.
- The resulting treatment residuals must be managed and disposed of in accordance with state and local regulations.

B9.4 Filtration

Filtration is the process used to (1) dewater waste effluents, slurries, and sludges generated from industrial treatment processes, and (2) remove undissolved heavy metals present in suspended solids. It does not reduce the toxicity of the waste.

The following criteria apply to meet treatment by filtration:

- The filtration equipment and its connection to the tank/container are totally enclosed.
- The dewatered liquid (filtrate) and wash water stream from the filtration process are designated and handled appropriately.
- The filter cake or filter media is designated and handled as hazardous or nonhazardous waste, as applicable, based on the designation.
- There are no regulated spills or releases from the operation to the environment or, if there are, they are cleaned up immediately.
- All equipment is decontaminated and/or disposed, as needed.

B9.5 Evaporation

Evaporation is the vaporization of a liquid from a solution or slurry. Types of evaporation include natural evaporation (e.g., solar energy), direct contact evaporation (i.e., heating source in contact with the liquid), and indirect evaporation (i.e., heating source separated from liquid by barrier).

The following criteria apply to meet treatment by evaporation:

- Inorganic wastes mixed with water should be treated in an evaporator. Inorganic wastes that could be treated in an evaporator include spent caustics, rinse waters, and water-based machining coolants.
- Organic waste solutions such as solvents, paints, or oils, cannot be treated in an evaporator unless all vapors are captured and there are no releases to the air, unless allowed by state authorities.
- Leave some water content in the remaining sludge, so the waste is not "overcooked."
- Designate and dispose of remaining sludge properly.
- Incorporate secondary containment around the evaporator to catch spills.

B9.6 Mercury Amalgamation

Mercury amalgamation is the chemical process used to bind elemental mercury waste with another chemical for stabilization, and must meet the following criterion:

- Elemental mercury waste may be combined with a solid amalgam for waste stabilization prior to disposal. After treatment by mixing the amalgam and the elemental mercury, there can be no freestanding liquids.

B9.7 Size Reduction

Much of the waste must be disassembled or cut into sections for size reduction in order to place the waste in an approved waste container; this is considered a treatment if it is performed on wastes designated as dangerous.

B9.8 Repackaging

Occasionally, a waste may need to be repackaged, due to void space issues, or a waste component from the already packaged container may need to be removed.

B10 Waste Disposal

As stated previously, it is anticipated that most of the regulated waste streams will be disposed of at ERDF, which is designed to meet RCRA minimum technical requirements for land disposal. The criteria for acceptance of waste at ERDF are presented in WCH-191.

Waste may be sent to an offsite facility subject to the facility having received a determination of acceptability by the EPA, in accordance with 40 CFR 300.440, as applicable.

B11 References

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49 CFR 171, "General Information, Regulations, and Definitions."

49 CFR 172, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans."

49 CFR 173, "Shippers—General Requirements for Shipments and Packagings."

49 CFR 173.412, "Additional Design Requirements for Type A Packages."

49 CFR 174, "Carriage by Rail."

49 CFR 175, "Carriage by Aircraft."

49 CFR 176, "Carriage by Vessel."

49 CFR 177, "Carriage by Public Highway."

49 CFR 178, "Specifications for Packagings."

49 CFR 179, "Specifications for Tank Cars."

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Attachment 1

CERCLA WASTE MANAGEMENT AREA INSPECTION CHECKLIST

Waste Management Area Location: _____

Date of Inspection: _____

Number of Containers in the Waste Management Area:

Dangerous Waste: _____ Mixed Waste: _____ Radioactive Waste: _____

Liquid Waste: _____ PCB Waste: _____Asbestos Containing Waste:_____

Other Waste (describe): _____Total Number of Containers: _____

GENERAL REQUIREMENTS:

	OK	No	NA
1. Containers are in good physical condition (i.e., not leaking or severely corroded)			
2. Containers are adequately identified (i.e., marking and labeling)			
3. Containers are closed and/or secured except when adding or removing waste.			
4. Separation between containers with incompatible waste is provided.			
5. Containers are placed with spacing to allow inspection of each drum.			
6. Safety and emergency response equipment is in place and adequate for the type of waste present.			

SPECIFIC REQUIREMENTS

7. Containers for dangerous waste have major risk marking.			
8. Containers for PCB waste have the PCB mark.			
9. Containers with free liquids are provided with secondary containment.			
10. Containers for asbestos containing waste materials are leak tight and provided with DOT Class 9 label and OSHA Asbestos Danger label.			

Comments for any "No" answers:

Status of Outstanding Issues Previously Identified

Inspector: _____
Printed Name/Signature

Management Reviewer: _____
Printed Name/Signature

Appendix C

REDOX Air Monitoring Plan

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Tables

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Terms

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ALARACT	as low as reasonably available control technology
ARAR	applicable or relevant and appropriate requirement
BARCT	best available radionuclide control technology
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HEPA	high-efficiency particulate air
MEI	maximally exposed individual
PTE	potential to emit
REDOX	Reduction-Oxidation
S&M	surveillance and maintenance

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C1 Introduction

Surveillance and maintenance (S&M) activities at the Reduction-Oxidation (REDOX) facility have the potential to emit (PTE) radionuclides or inadvertently release criteria and toxic pollutants and asbestos during performance of S&M activities. This air monitoring plan describes the implementation of the air emission requirements during S&M. This plan addresses best available radionuclide control technology (BARCT) for new construction or significant modifications, or as low as reasonably available control technology (ALARACT) for existing emission units or nonsignificant modifications, pursuant to WAC 246-247-040(3) and (4), "Radiation Protection-Air Emissions," "General Standards," and 40 CFR 61.12(c), "National Emission Standards for Hazardous Air Pollutants," "Compliance with Standards and Maintenance Requirements," has been identified as applicable requirements. Air monitoring (40 CFR 61.93, "National Emission Standards for Hazardous Air Pollutants," "Emission Monitoring and Test Procedures," and WAC 246-247-075[18], "Radiation Protection—Air Emissions," "Monitoring, Testing and Quality Assurance") has also been identified as a requirement that is applicable for the removal action. This plan describes how the requirements will be implemented, consistent with the Hanford Site Air Operating Permit (AOP-00-05-06, 2007).

C2 Planned Activities

Surveillance activities are necessary at REDOX while awaiting a final *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedy decision to ensure that conditions within the facility have not changed to the point where the threat of a release has increased. Maintenance activities ensure proper functioning of operational equipment and actions necessary to control hazards, prepare for demolition, reduce risks, and reduce ongoing S&M costs. Typical S&M activities performed in these facilities include, but not limited to, minor activities such as exterior and interior inspections, checking door security for any unauthorized building intrusions and structural integrity, water intrusion cleanup, waste handling/removal, maintaining radiological airborne control zones, animal or insect intrusion abatement, maintaining operating systems and building integrity, eliminating utilities when possible, identifying and reducing hazards, and housekeeping. As needed, maintenance activities are performed to address a threat of release.

When needed to prevent a threat of release, maintenance activities will be performed. This may require removal and management of hazardous substances and contaminated equipment and materials. Decontamination activities may need to be conducted to remove loose accessible contamination from components, equipment, and structures. Decontamination activities also include stabilizing or "fixing" contaminants in place, so that contaminants are attached to the materials and would be less likely to be disturbed. Decontamination methods may include, but are not limited to, wiping; applying decontamination solutions, paint, asphalt, or other fixatives; scabbling; abrasive blasting; removing the contaminated component; and high-efficiency particulate air (HEPA) filtered vacuuming.

C3 Radiological Air Emissions

Federal regulations (40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities") require that radionuclide airborne emissions be controlled, so that any member of the general public would not receive an exposure greater than 10 mrem/yr effective dose equivalent. The same regulation requires continuous monitoring of point sources (i.e., stacks or vents) with a major potential for radioactive airborne emissions and periodic confirmatory measurement of minor source emissions sufficient to verify low emissions.

Monitoring of fugitive or nonpoint sources emitting radioactive airborne emissions (WAC 246-247-075[8]) will be addressed by sampling the effluent streams and/or ambient air, as appropriate, using reasonable and effective methods. As low as reasonably achievable (ALARA)-based controls of radioactive airborne emissions to the extent economically and technologically feasible (WAC 246-247-040[3] and [4] and associated definitions) that could be reasonably expected to reduce emissions will also be addressed.

C3.1 Airborne Source Information

REDOX maintains a ventilation system that exhausts through a point source stack. The primary radionuclides of concern, abatement systems and the annual unabated potential to generate particulate and gaseous emissions from the point source are identified in Table C-1. For the primary radionuclides of concern, it is noted that there may be other isotopes present due to activation products, fission products, decay products, sources, and standards.

Table C-1. Primary Radionuclides, Point Sources and Abatement Systems, and PTE

Facility	REDOX
Primary radionuclides of concern	Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Am-241, Sr-90, Y-90, Cs-137
Abatement technology[a]	**291-S-1:** 1 sandfilter, fans (two in parallel, one operating, one backup)[a]
PTE[b]	2.14E-03 mrem/yr

a. DOE/RL-2013-12, *Radionuclide Air Emission Report for the Hanford Site, Calendar Year 2012.*

b. WDOH, 2012, *Radioactive Air Emissions License for the Department of Energy Richland Office Hanford Site License*, License Number: FF-01.

HEPA = high-efficiency particulate air

PTE = potential to emit

REDOX = Reduction-Oxidation

The annual unabated PTE and resultant effective dose calculation for the onsite maximally exposed individual (MEI) from the point sources are based on the estimated holdup in the buildings and the dose-per-release factors from *Calculating Potential-to-Emit Radiological Releases and Doses* (DOE/RL-2006-29). The onsite MEI is defined as a member of the public who spends a normal workday at a Hanford Site facility that is not under the auspices of the U.S. Department of Energy (DOE). This represents the shortest distance from the respective point to the MEI, resulting in the most conservative total effective dose equivalent to the MEI. The onsite MEI for REDOX is located at the Laser Interferometer Gravitational Wave Observatory on the Hanford Site (DOE/RL-2006-29).

In addition to the facility point sources identified in Table C-1, there is a small potential for fugitive radioactive airborne emissions resulting from the S&M activities. PTE from the S&M activities is expected to be insignificant. Because potential emissions are anticipated to be inconsequential, no estimate is made for potential emissions from the S&M activities.

C4 Best Available Radionuclide Control Technology/ As Low As Reasonably Achievable Control Technology

For those structures where the existing ventilation systems for the structures are active, the abatement controls that are part of those systems will continue to be used. As needed, temporary exhausters that provide equivalent or better abatement capability as that of the current systems may be used to supplement or replace existing systems. Although there is minimal potential for the surveillance activities to release radioactive emissions to the atmosphere, if there is a potential to disturb radioactive contamination, implementation of BARCT/ALARACT to minimize the potential for radioactive emissions has been identified as an ARAR. The use of wiping or applying fixatives is an ALARA control that has been accepted as BARCT/ALARACT for fugitive particulate radionuclide air emissions, particularly when the potential offsite dose is low. Glovebags may also be used to reduce potential emissions. For vacuuming and the use of portable ventilation units, HEPA filters are used to collect and filter emissions. The use of HEPA filters has been generally accepted as BARCT/ALARACT, and their use is encouraged whenever practical during activities that could generate emissions. HEPA filters shall have efficiency testing performed upon installation and on an annual basis thereafter and must be demonstrated to have 99.95 percent removal efficiency. Exhaust points from HEPA filters will be monitored on a routine basis for potential radionuclide releases and results recorded (e.g., post-survey results negative). Any positive survey results will require appropriate maintenance on the facility, exhauster, or vacuum to ensure that continued releases do not occur. Records of routine monitoring and necessary maintenance will be provided to the U.S. Environmental Protection Agency (EPA), Washington State Department of Ecology, or the Washington State Department of Health staff upon request. When there is potential to disturb contamination that may be a source of radioactive fugitive emissions, dust suppressants (e.g., water and fixatives) will be used and are considered BARCT/ALARACT.

C5 Airborne Emission Monitoring

While the existing ventilation systems for REDOX are active, the existing monitoring systems for the associated stacks will continue to be used. System maintenance, calibration, and field checks of the ventilation systems will be performed based on the S&M contractor quality assurance plans (CHPRC-00189, *CH2M HILL Plateau Remediation Company Environmental Quality Assurance Program Plan*, or similar document).

Near-facility air monitoring stations will be used to monitor for ambient air radionuclide air emissions from S&M activities. The current near-facility air monitoring stations are identified in Table C-2. The number and location of monitoring stations may change over time based on the needs of the near-facility monitoring program. Operation of air monitors at the Hanford Site follows the protocol for the Environmental Surveillance Program or the Near-Facility Monitoring Program, as appropriate, for air sample changeout frequency and radionuclide analysis. The samples are composited and analyzed for gamma energy-emitting radionuclides, strontium-90, plutonium isotopes, and uranium isotopes. The data results for these air monitors are entered into the Hanford Environmental Information System database and/or the Automated Bar Coding of Air Samplers at Hanford database. Data collected from air monitoring are summarized in the annual report that is prepared for the Hanford Site in compliance with 40 CFR 61, Subpart H and WAC 246-247 and that is used to demonstrate compliance with 40 CFR 61.92.

Table C-2. Near-Facility Monitoring

Facility	REDOX
Near Field Monitors	N441, N442, N963

REDOX = Reduction-Oxidation

C6 Air Contaminant and Toxic Air Pollution Emissions

The primary source of emissions resulting from S&M activities will be fugitive particulate matter. Consistent with WAC 173-400-040(3) and (8), "General Regulations for Air Pollution Sources," "General Standards for Maximum Emissions," reasonable precautions will be taken to prevent the release of air contaminants associated with fugitive emissions resulting from demolition, materials handling, or other operations and prevent fugitive dust from becoming airborne from fugitive sources of emissions.

C6.1 Criteria Pollutants

Operation of trucks and other diesel-powered equipment during the removal activities would be expected, in the short term, to introduce quantities of sulfur dioxide, nitrogen dioxide, particulates, and other pollutants to the atmosphere, typical of similar sized construction projects. These releases would not be expected to cause any air quality standards to be exceeded. Generation of dust due to traffic would be minimized by watering or other dust control measures (e.g., use of fixatives). Vehicular and equipment emissions will be controlled and mitigated in compliance with the substantive standards for air quality protection that apply to the Hanford Site. These techniques are considered reasonable precautions to control fugitive emissions as required by the substantive requirements.

C6.2 Asbestos

Asbestos abatement activities will be performed in full compliance with all substantive NESHAP standards that are ARAR for the work. Prior to commencement of asbestos abatement work, a thorough inspection of the affected facility will be performed for the presence of asbestos , including Category I and Category II nonfriable asbestos-containing material (ACM). All Category II nonfriable ACM will generally be presumed to be potentially friable and will be removed prior to the start of actual demolition activities. For Category II ACM that should be allowed to remain in place during demolition based on knowledge that the demolition will not render it friable, information identifying the planned demolition approach and describing how the Category II ACM will not become crumbled, pulverized, or reduced to powder, by the forces expected to act on it during demolition or otherwise friable will be provided in advance to the lead regulatory agency for approval. Category I nonfriable ACM will also be removed prior to the start of actual demolition activities, except in situations where demolition practices will be used that can be or have been demonstrated to the satisfaction of the lead regulatory agency to not render the Category I friable, consistent with the NESHAP standards. Demonstration can be performed using existing EPA or Washington State guidance regarding asbestos abatement under NESHAP. Such Category I nonfriable ACM must not be in poor condition and planned demolition activities must not subject the ACM to sanding, grinding, cutting, or abrading. In all cases, ACM that is either friable or cannot be demonstrated to remain nonfriable during a demolition will be removed prior to such demolition as required by NESHAP.

C6.3 Control Methods

Based on analysis of the potential emissions and analysis of available control technologies, the following controls have been selected for use during the removal action:

- Water will be applied, as needed, during grading, excavation, backfilling, or recontouring activities to spray for suppression of fugitive emissions including dust.
- To reduce emissions of criteria pollutants that are associated with the operation of diesel equipment, if new equipment is acquired, it will meet the Tier 4 emission requirements. Tier 4 generation engines and equipment require ultra-low sulfur diesel fuel that has no more than 15 parts per million of sulfur.
- To reduce potential emissions of volatile organic compounds and toxic air pollutants, waste containers will be kept closed unless waste is being added to the container.
- Fixatives will be applied to structural materials, debris, and equipment, and/or contaminated soil, as needed, to minimize airborne contamination for fugitive emissions and dust. Fixative application techniques may include spraying, fogging, brushing on, pouring, or some other method, as necessary.
- Fixatives or cover material (e.g., soil and gravel) will be applied to disturbed contaminated soils, when field activities will be inactive more than 24 hours. However, if a fixative has already been applied and the fixed contaminated items will remain undisturbed, further use of fixatives will not be needed. Fixatives or other controls will not be applied when the contaminated items are frozen or if it is raining or snowing or other freezing precipitation is falling.
- Field activities will be temporarily ceased, and the area will be placed in a safe configuration if airborne contamination control measures are not expected to be adequate based on site conditions (e.g., excessive wind). Additionally, a fixative will be applied, as needed, to help control dust and radiological and nonradiological contaminants.
- If unanticipated new sources of airborne pollutants are encountered, PTE will be reviewed, and appropriate controls will be implemented, if required.

C6.4 Reporting Requirements for Nonroutine Releases

Reporting requirements for nonroutine releases are contained in the S&M contractor procedures and are based on the ARARs pertinent to the nonroutine releases of hazardous substances.

40 CFR 302, "Designation, Reportable Quantities, and Notification," requires immediate notification to the National Response Center on discovery of a previously unidentified release of a hazardous substance into the environment in excess of a reportable quantity.

40 CFR 355, "Emergency Planning and Notification," requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the State Emergency Response Commission for a release of a reportable quantity of an extremely hazardous substance or a CERCLA hazardous substance.

C7 References

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants," *Code of Federal Regulations*. Available at: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol8/xml/CFR-2010-title40-vol8-part61.xml.

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