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Revision 0

Removal Action Work Plan for the Northern Part of the BC Controlled Area (UPR-200-E-83) Located Within the 200-UR-1 Operable Unit

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

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

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J. D. Aardal 07/03/2008
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APPROVAL

DOE/RL-2008-22, *Removal Action Work Plan for the Northern Part of the BC Controlled Area (UPR-200-E-83) Located Within the 200-UR-1 Operable Unit*, Rev. 0.

Matthew S. McCormick, Assistant Manager
U.S. Department of Energy
Richland Operations Office

2 July 08
Date

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Cheryl L. Whalen, Cleanup Section Manager
Hanford Project Office
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Date 7/2/08

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ACRONYMS

Action Memorandum	*Action Memorandum for the Non-Time-Critical Removal Action for the Northern Part of the BC Controlled Area (UPR-200-E-83)* (DOE/RL-2008-21)
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirements
BHI	Bechtel Hanford, Inc.
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	Code of Federal Regulations
CWC	Central Waste Complex
D&D	decontamination and demolition
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOT	U.S. Department of Transportation
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	200 Areas Effluent Treatment Facility
FFS	focused feasibility study
ft	foot/feet
ft^2	square foot/feet
HASP	health and safety plan
HEPA	high-efficiency particulate air
km/hr	kilometer per hour
LDR	land disposal restriction
LIGO	Laser Interferometer Gravitational Wave Observatory
MEI	maximally exposed individual
mph	miles per hour
mrem/yr	millirem per year
NPL	National Priorities List
OU	operable unit
PP	proposed plan
PPE	personal protective equipment
PRG	preliminary remedial goals
RAWP	removal action work plan

RCRA	*Resource Conservation and Recovery Act of 1976*
RCW	Revised Code of Washington
RTD	removal, treatment, and disposal
RWP	radiological work permit
SAP	sampling and analysis plan
SAI	sampling and analysis instruction
TBC	to-be-considered
TEDE	total effective dose equivalent
TEDF	Treated Effluent Disposal Facility
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
WAC	Washington Administrative Code
WSCF	Waste Sampling and Characterization Facility

REMOVAL ACTION WORK PLAN FOR THE NORTHERN PART OF THE BC CONTROLLED AREA (UPR-200-E-83) LOCATED WITHIN THE 200-UR-1 OPERABLE UNIT

1.0 INTRODUCTION

Facilities on the Hanford Site were used from 1943 until 1990 to produce nuclear materials for national defense. In July 1989, the Hanford Site was listed on the National Priorities List under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980*, as amended by the *Superfund Amendments and Reauthorization Act of 1986*. The Hanford Site was originally divided into four National Priorities List (NPL) sites, but is now listed, as three NPL sites: the 100 Areas, the 200 Areas, and the 300 Area.

The 200-UR-1 Operable Unit (OU) consists of two sites located outside the 200 Areas near the center of the Hanford Site in south-central Washington State. One of the sites, the BC Controlled Area, is located south of the 200 East Area (in what is commonly called the 600 Area). This waste site is located outside the 200 Area Core Zone boundary[1]. Document preparation and planning for potential future actions at 200-UR-1 OU past-practice waste sites are following the CERCLA remedial investigation/feasibility study (RI/FS) process. This removal action work plan (RAWP) contains the pertinent information to support the implementation of the *Action Memorandum for the Non-Time-Critical Removal Action for the Northern Part of the BC Controlled Area (UPR-200-E-83)* (DOE/RL-2008-21) (Action Memorandum), which implements the selected alternative from the *Engineering Evaluation/Cost Analysis for the Northern Part of the BC Controlled Area (UPR-200-E-83)* (EE/CA) (DOE/RL-2007-51), which included public comment.

As part of this removal action, DOE has designated an On-Scene Coordinator pursuant to the requirements of 40 Code of Federal Regulations (CFR) 300.120 to ensure compliance with the National Contingency Plan and the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989).

The removal action supports minimization of potential releases of hazardous substances from the BC Controlled Area that could adversely impact human health and the environment, is protective of site personnel and the environment, and contributes to the efficient performance of any future 200-UR-1 OU removal and/or remedial actions.

1.1 BACKGROUND

The purpose of the EE/CA for the BC Controlled Area was to evaluate removal action alternatives to mitigate threats to human health and the environment posed by contaminated soil in the northern part of the BC Controlled Area in Zones A and B (Figure 1-1). The contaminated soil has recently been determined through analytical sampling to pose an unacceptable risk to ecological receptors, containing levels of cesium-137 and strontium-90, which range between approximately 0.32 to 3420 pCi/g.

The northern part of the BC Controlled Area addressed by the EE/CA does not include the BC Cribs and Trenches, which are separate waste sites to be addressed in the 200-BC-1 OU. The southern part of the BC Controlled Area, an area located south of the northern boundary of the sand dunes is also not

[1] This application of the Core Zone boundary is defined in the *Hanford Site End State Vision* (DOE/RL-2005-57).

addressed by the EE/CA, because recent surveys have shown it does not contain any radiological contamination above the preliminary remedial goals for the 200-UR-1 OU.

The EE/CA evaluated three removal action alternatives:

- Alternative One: No Action
- Alternative Two: Monitored Natural Attenuation/Institutional Controls
- Alternative Three: Remove, Treat, and Dispose.

Alternative One assumed all short-term and long-term survey and maintenance activities were terminated. Alternative Two evaluated using natural decay processes to lower contaminant concentrations, while relying on institutional controls of the area to prevent migration of the contaminants. Alternative Three included removal of soil [to approximately 15.2 centimeters (6 inches) or to preliminary remediation goals, to the extent practicable] from Zone A and from select areas of elevated contamination in Zone B. These areas of elevated contamination above preliminary remediation goals are commonly referred to as "hotspots".

After summarizing site characteristics, providing a site description, and establishing removal action objectives, these alternatives were evaluated in terms of effectiveness, implementability, and cost. The EE/CA contains a detailed summary and comparison of the relative performance of each alternative.

The recommended removal action alternative for the BC Controlled Area is Alternative 3: Remove, Treat, and Dispose. The total volume of contaminated soil that will be removed under Alternative 3 is approximately 181,000 m^3 (237,000 yd^3), estimated to weigh 327,000 tons.

The removal action would accomplish the following, which are summarized from the analysis of alternatives:

- Remove contaminated soil that poses a threat to ecological receptors.

- Reduce the areas of contamination at the Hanford Site by removing the principal threat at the BC Controlled, Hanford's largest surface waste site.

- Support the Hanford cleanup mission by providing the Environmental Restoration Disposal Facility (ERDF) with contaminated soil to meet its operating requirements.

- Contribute to the long-term cleanup goal for the 200 Area.

This alternative was recommended based on its overall ability to protect human health and the environment and its effectiveness in maintaining protection for both the short and the long term. This alternative would also reduce the potential for further releases to the environment by reducing the inventory of contaminants to below the preliminary remediation goals. This alternative provides the best balance of protecting human health and the environment, protecting workers, and providing an end state that is consistent with future cleanup actions and commitments of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989).

The Action Memorandum (DOE/RL-2008-21) documents approval of the removal action. This RAWP describes the implementation of the actions, which will be taken in support of contaminated soil removal that poses an unacceptable risk to human health and the environment for the BC Controlled Area, located within the 200-UR-1 OU on the Hanford Site, Richland, Washington.

1.2 PURPOSE

The removal action supports minimization of potential releases of hazardous substances from the BC Controlled Area that could adversely impact human health and the environment, is protective of site personnel and the environment, and contributes to the efficient performance of any future 200-UR-1 OU removal and/or remedial actions.

This RAWP is used to establish the methods and activities required for performance of the following functions in support of contaminated soil removal at the BC Controlled Area. The intent of this RAWP is to identify the basis and to provide criteria for the preparation of work packages and subcontract task orders for the project tasks. Using the most recent information concerning the area conditions, field-level work packages will be developed to direct work activities and instruct workers in the applicable work methods.

1.3 SCOPE

The scope for the removal action at the BC Controlled Area (UPR-200-E-83) is removal, treatment, and disposal (RTD) of Zone A and B in the area adjacent to the BC Cribs and Trenches, which are above ecological risk thresholds for cesium-137 (Cs-137) and strontium-90 (Sr-90). This removal action provides overall protection of human health and the environment, complies with ARARs, and is cost effective.

The following activities are addressed under the scope of this non-time-critical removal action:

- Complete or partial removal of sagebrush and other plant growth that exists on the more highly contaminated areas in the BC Controlled Area, located near the BC Cribs and Trenches
- Excavation to a minimum of 15 centimeters (6 inches) of contaminated soil in the more highly contaminated areas (Zone A) of the BC Controlled Area (Figure 1-1); further excavation will be required in specific areas (Zone B) where data indicates surface contamination
- Contouring the area to prepare for re-vegetation with native plant growth.

The BC Controlled Area removal action schedule presents the logical progression of events and the estimated duration for each activity in fiscal year 2008. The project schedule is presented for fiscal year 2008 and is included as Appendix A in this RAWP. An updated schedule for this RAWP is due to U.S. Department of Energy, Richland Operations Office (DOE-RL) and Washington State Department of Ecology (Ecology) by June 30, 2009.

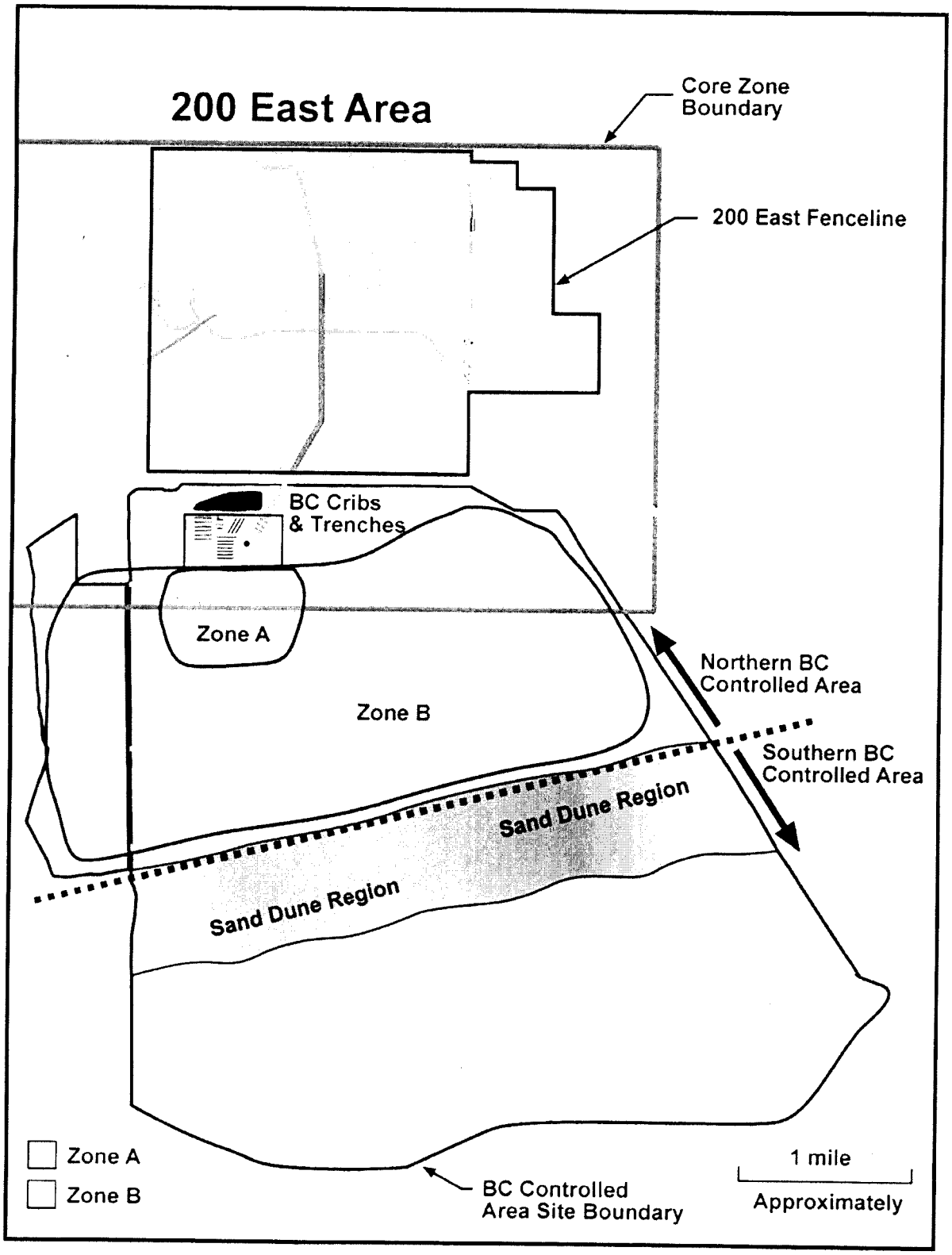

Figure 1-1. CERCLA Removal Action Area.

1.4 OBJECTIVES

The removal action alternatives evaluated for the BC Controlled Area must meet the removal action objectives. The removal action objectives were developed in conjunction with the proposed remediation objectives for the 200-UR-1 OU, reasonable anticipated land use[2], contaminants of concern, potential ARARs, and potential exposure pathways.

The following removal action objectives (RAO) were developed for this removal action:

- Removal Action Objective 1 – Provide conditions suitable for the reasonable anticipated future land use[2] and protect human health and ecological receptors, respectively, by
  - Preventing exposure to radiological constituents at levels that exceed the CERCLA risk exposure of 10^{-4} to 10^{-6}. As an operational guideline, the standard of 15 mrem/yr above background is in agreement with the EPA's radionuclide soil cleanup guidance, as described in OSWER Directive 9200.4-18, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* (EPA 1997).
  - Protecting ecological receptors based on a dose rate limit of 0.1 rad/day for terrestrial wildlife populations [DOE-STD-1153-2002, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*, which is a to-be-considered criteria].
- Removal Action Objective 2 – Prevent adverse impacts to cultural resources and threatened or endangered species, and minimize wildlife habitat disruption.

Waste sites in the 200-UR-1 OU currently are being evaluated via the CERCLA remedial investigation/feasibility study (RI/FS) process for final remedial decision and final remedial action goals are not yet established. Therefore, this removal action will use the 200-UR-1 OU radionuclide soil cleanup preliminary remediation goals (PRGs) identified in DOE/RL-2006-50. As an operational guideline, preventing exposure to below a dose rate limit of 15 mrem/yr above background is in agreement with the EPA's radionuclide soil cleanup guidance, as described in OSWER Directive 9200.4-18, Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination (EPA 1997). A dose rate limit of 15 mrem/yr above background generally controls risk to less than the EPA excess lifetime cancer risk threshold, which ranges from 10^{-6} to 10^{-4}.

Meeting the 200-UR-1 OU PRGs and the potential applicable or relevant and appropriate requirements (ARARs) and, by extension, achieving remedial action objectives, can be accomplished by reducing concentrations (or activities) of contaminants to remediation goal levels or by eliminating potential exposure pathways/routes. The PRGs for the removal action also serve as the soil removal action cleanup levels, to the extent practicable. If the removal action cleanup levels are not met once the removal action has been completed, this information will be documented and incorporated into the FS/Proposed Plan for the 200-UR-1 OU.

Sr-90 and Cs-137 are the primary radiological contaminants known to exist in the BC Controlled Area, based on recent sample data collected for the 200-UR-1 OU and the 200 Area Ecological characterization.

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[2] While both industrial (inside the Core Zone) and conservation/mining (outside the Core Zone) land use scenarios apply to the northern part of the BC Controlled Area, final cleanup levels have not been established for the BC Controlled Area and the 200-UR-1 OU. Therefore, the preliminary removal goals (PRGs) for human health and environmental protection will be based on the 200-UR-1 OU PRGs, consistent with unrestricted land use, to preclude the need for additional cleanup in the future.

Table 1-1 identifies the Cs-137 and Sr-90 removal action cleanup levels at the BC Controlled Area waste site:

Table 1-1. Summary of Radionuclide Soil Removal Action Cleanup Levels.[a]

Constituent	Hanford Site Background[b] (pCi/g)	Required Detection Limit (RDL)[c] (pCi/g)	Overall Removal Action Cleanup Levels[d] (pCi/g)
Cesium-137	1.05	0.1	12.4
Strontium-90	0.178	1	9.0

[a] The removal action cleanup levels are the same values specified in the 200-UR-1 SAP (DOE/RL-2006-50).
[b] Background values based on DOE/RL-96-12, Table 5-1, lognormal distribution 90%.
[c] The RDL is based on current approved laboratory contractor RDL. The RDL is consistent with the practical quantitation limits defined in WAC 173-340-200. The RDL is used because it is the contractual defined criteria.
[d] Listed values represent the most restrictive soil removal action cleanup levels as identified in DOE/RL-2006-50. Values represented are for screening purposes. Site-specific evaluation and modeling will be performed to determine if remedial action objectives have been attained.

The removal action closeout documentation will contain information on whether or not the removal action cleanup levels were attained. This information will be used in the 200-UR-1 OU FS to determine if any additional remediation is needed.

1.5 FACILITY AND HAZARD DESCRIPTION

This section describes portions of the BC Controlled Area which are within the scope of this removal action and summarizes the unplanned release that resulted in hazards at these locations.

The *Historical Site Assessment of the Surface Radioactive Contamination of the BC Controlled Area* (WMP-18647) contains detailed information on the BC Controlled Area and the contamination sources. The BC Controlled Area is the result of unplanned spreads of contamination, primarily from the adjacent BC Cribs and Trenches. The BC Cribs and Trenches were constructed in 1955 and received radioactive discharges of liquid waste via underground pipeline from two general sources: the uranium recovery project and 300 Area wastes between 1956 and 1957 with the majority of the waste from the uranium recovery project. The 300 Area wastes were from the Plutonium Recycle Test Reactor (PRTR) and the laboratories. The primary radionuclides for the BC Cribs and Trenches were cesium-137 and strontium-90; others present in some abundance were plutonium-239/240, europium-155, cobalt-60, and americium-241.

During the 1950s and 1960s, animal intrusion (burrowing) into the trenches was noted to be taking place. The most likely mechanisms of contamination spread were uptake of contaminated salts by animals and resultant spread of fecal droppings and root uptake by tumbleweeds and resultant spread by breakup of those windblown weeds. In 1969, about 60,000 yd^3 of sand and gravel were used to cover and stabilize the BC Trenches, thus halting most of the uptake of contamination from these sources. When the BC Cribs and Trenches were covered, it was identified that an adjacent area of about 10.3 km^2 (4 mi^2) was contaminated. Aerial surveys in 1973 and 1978 showed varying amounts of surface soil Cs-137 contamination, with the highest levels associated in areas immediately adjacent the BC Cribs and Trenches. Additional characterization activities occurred in the following years, outlined in WMP-18647 Rev. 0.

In August 1974, it was concluded, there was no indication of undue risk to the public and employees and, therefore, no immediate action was necessary to decontaminate the area. However, by the late 1970s and early 1980s, the stabilization measures that had been taken in the 1960s had failed and contamination was spreading, primarily due to contaminated tumbleweeds and animal intrusion (WMP-18647). In 1982, additional stabilization of the BC Cribs and Trenches area was completed. Discoveries of contamination spread at the BC Controlled Area continued to occur after this stabilization. Aerial surveys in 1973, 1978, and 1988 showed various amounts of contamination spread originating from the BC Cribs and Trenches area and spread throughout what is now identified as the BC Controlled Area.

By late January or early February 1997, surveys had been completed and the present Soil Contamination Area established. This action expanded the posted area associated with the BC Cribs and Trenches from about 10.3 km (4 mi^2) to 34.7 km^2 (13.4 mi^2). Responsibility was transferred to Fluor Hanford in October 2002.

An assessment of the nature and extent of contamination of the BC Controlled Area is described in greater detail in the *200-UR-1 Unplanned Release Waste Group Operable Unit Remedial Investigation/Feasibility Study Work Plan* (DOE/RL-2004-39) and WMP-18647, along with identification of supporting sources of historical information. In addition, recent analytical sampling of this area was conducted under the *200-UR-1 Unplanned Release Waste Group Operable Unit Sampling and Analysis Plan* (DOE/RL-2006-50) and the *Sampling and Analysis Instruction for BC Controlled Area Soil Characterization* (D&D-24693).

Historical and recent characterization information shows that within the northern part of the BC Controlled Area is a zone of continuous radiological contamination, confirmed by both radiological screening and analytical measurements. This continuous zone is known as "Zone A" of the BC Controlled Area. The remainder of the Northern part of the BC Controlled area is non-continuous radiological contamination, generally being more dispersed to the South. This section is known as "Zone B"; this area contains differing levels of contamination than Zone A. Zone B contains what is sometimes referred to as "hotspots" of contamination. See Figure 1-1 for approximate sizes of Zone A and Zone B.

Contamination in the northern part of the BC Controlled Area is believed to be bound to the soil; cesium-137 and strontium-90 are the primary radiological contaminants. Sampling in 1999 showed that strontium surface soil concentrations range from 0.32 to 3420 pCi/g across the northern part of the BC Controlled Area. Cesium-137 surface soil concentrations range from 0.35 to 2290 pCi/g across the area. Thus, the surface soil concentrations of cesium-137 and strontium-90, the two radionuclides likely to deliver the greatest dose to a recipient, vary widely across the northern part of the BC Controlled Area. According to WMP-18647, soil depth profiles of activity are also expected to vary. Recent analytical data (i.e., calendar years 2005 and 2007) has shown the bulk of activity in places with contamination due to biological transport mechanisms (i.e., spread from animals) is primarily in the top 15 cm (6 in.) of soil, but is greater in some areas. For areas contaminated due to non-biological transport mechanisms (i.e. windblown contamination), primarily in Zone B, the radionuclides are probably in the top 2.5 cm (1 in.) of soil, except for strontium-90, which is distributed down about 6-in, based on sample results. The top inch is expected to contain about 40 percent of the strontium-90. Depth profiles are discussed in greater detail in Section 3.5 of WMP-18647.

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2.0 REMOVAL ACTION ELEMENTS

The following sections provide a general description of how work activities will be performed to remove the contaminated soil in the BC Controlled Area.

2.1 REMOVAL ACTION WORK ACTIVITIES

As stated in Section 1.3, RTD was selected as the alternative for the higher contaminated portions of the BC Controlled Area, identified as Zone A and Zone B (Figure 1-1).

Soil and plant debris within this area, with contaminant concentrations above the removal action cleanup levels, will be removed using conventional techniques and will be disposed at ERDF. Special precautions will be used to minimize the generation of onsite fugitive dust. Excavation depths will be to a minimum of 15 centimeters (6 inches), based on sample data indicating the contamination depth over ecological risk screening levels. For areas where contamination exists at greater depths, removal to greater depths [up to 1.3 m (4 ft)] may occur. Depending on the configuration of the area to be excavated, shoring or sloping might be required to comply with safety requirements and to reduce the quantity of excavated soil.

The cleanup of the BC Controlled Area under this RTD action will be guided by the observational approach, which includes radiological surveys. The observational approach is a method of planning, designing, and implementing an action that relies on information (e.g., samples) collected and analyzed during the removal action to guide the direction and scope of the effort. Data collected are used to assess the extent of contamination and to make "real time" decisions in the field. Targeted (or hot spot) removals could be considered under this alternative if contamination is localized in only a portion of a waste site; this will occur primarily in Zone B.

Radioactive waste requires special handling protocols, but remote-controlled equipment is not necessary, based on process knowledge and observed concentrations of radionuclides from characterization activities. Removal technologies do not require that the precise extent of contamination be known before excavation. Rather, the extent of contamination is assessed as the excavation proceeds, and the extent of removal is adjusted accordingly. In this removal action, soils will be removed until the removal action cleanup levels are achieved or to meet the removal action objectives. If previously unknown contamination above the removal action cleanup levels is discovered, the extent of the removal activities may be increased following consultation with DOE-RL, EPA, and Ecology. Based on existing information, soil and/or debris removed from the waste sites are not anticipated to require ex situ treatment to meet disposal requirements at the ERDF or to reduce waste volumes. Contaminated soil will be containerized on site (e.g., containers, bulk shipment) and transported to the ERDF, located near the 200 West Area. Low-level radioactive waste and/or hazardous waste are acceptable for disposal at the ERDF, in accordance with the waste acceptance criteria (*Environmental Restoration Disposal Facility Waste Acceptance Criteria*, WCH-191).

The following sections describe the field activities associated with RTD of the BC Controlled Area, including the activities associated with waste site excavation, material handling, and containerization of contaminated soil for disposal at the ERDF.

2.1.1 Mobilization and Site Preparation

Mobilization and site preparation include the following activities, which are necessary to prepare the site for excavation:

- Establishing site utility services as required.

- Constructing roads, field support facilities, container survey stations, and decontamination stations. Hanford Site roadways are constructed of existing site materials, except the surface course, which is imported. Field support facilities provide a changing area, lunchroom, and construction offices at individual sites. The changing area includes lockers, benches, showers/restrooms, and storage for both clean and contaminated personal protection equipment.

- Stripping the existing vegetation and debris. Stripping removes surface and near-surface materials (including vegetation and roots, cobbles, and boulders).

2.1.2 Waste Site Excavation and Utility Removal

Excavation requires equipment operations in uncontaminated and contaminated soil and debris of varying physical properties (for example, fine sand to boulders of varying sizes). Guidance for the excavation shall be determined in accordance with the requirements of 29 CFR 1910, "Occupational Safety and Health Administration, Department of Labor" and 29 CFR 1926, Subpart P, "Excavations".

During excavation layout and preliminary civil land survey, local topography will be reviewed to determine whether precipitation run-on/run-off potential exists and whether mitigative measures (e.g., installation of earthen berms) must be taken. Excessive run on from surrounding areas could affect slope stability and has the potential to spread contamination.

Civil land survey shall be accomplished using coordinate datum NAD 83/91, Washington coordinate system (south zone), and elevation datum NAVD88.

Visible dust emissions beyond the immediate area of active excavations are not permitted and will result in suspension of work. Active excavations shall use water or other methods as approved for dust control, in accordance with agreements between the DOE-RL, EPA, and the Washington State Department of Health. Water usage for dust control shall be minimized to protect against contaminant migration. Crusting agents or fixatives shall be applied to any disturbed portion of the contamination area that will be inactive for more than 24 hours. Material to be disposed at ERDF shall also comply with the moisture content and other applicable requirements of WCH-191.

2.1.3 Stabilization

Although not anticipated, some waste materials may require stabilization to maintain worker exposures to airborne and/or direct radiation as low as reasonably achievable (ALARA).

2.1.4 Material Handling and Transportation

All contaminated materials (including excavated soils, debris, disposable protective clothing, and trash) require proper packaging, handling, and transportation in accordance with this RAWP's Waste Management Plan, Section 4.2. Contaminated bulk materials will be hauled in the standard ERDF open-top, hinged-gate roll-off boxes that are designed for a maximum payload of approximately 18.1 metric tons (20 tons) or an approved alternative. The bulk containers will be transported on roll-on/roll-off trailers with hydraulic dumping capabilities that are towed by conventional tractor units or dump trucks. The trailers and tractors will be suitable for operating on sloped excavation access ramps and other off-road ramps, and meet applicable U.S. Department of Transportation (DOT) requirements. The wheel wells of the tractor will be constructed to prevent soil from being thrown onto the trailer and its containers during transport. Containers will be transported from the BC Controlled Area to the ERDF

over existing Hanford Site roadways or by a direct haul route. Each shipment of soil/debris transported to the ERDF will be referenced to a waste profile that is intended to bound the levels of hazardous constituents in the material found at the site. The waste profile is in effect unless and until the characteristics of the excavation site change significantly. Empty containers returning from the ERDF will be removed from the ERDF tractor trailers in the CERCLA Waste Container Storage Area and rolled on to project haul trucks for refilling or keep on the direct haul truck. The CERCLA Waste Container Storage Area helps to maintain a continuous flow of materials through the transportation system by allowing excavation to continue for a limited time if the trucks running to the ERDF are not operating, or by allowing ERDF trucks to continue to run for a limited time if the excavators are not operating.

2.1.5 Data Quality Objectives Process and Characterization

The EPA-developed data quality objectives (DQO) process has been used to develop the data collection, sampling, analysis rationale, strategy, and requirements for characterization efforts. The results of the DQO process are documented in the EPA approved *200-UR-1 Unplanned Release Waste Group Operable Unit Sampling and Analysis Plan* (SAP) (DOE/RL-2006-50) and the *Sampling and Analysis Instruction for BC Controlled Area Soil Characterization* (SAI) (D&D-24693).

2.1.6 Soil and Debris Characterization

Soil and debris characterization will be performed in accordance with the SAP (DOE-RL-2006-50) and the SAI (D&D-24693). This approach relies on available historical information and limited field investigations combined with a "characterize-and- remove-in- one-step" methodology. The latter methodology consists of site excavation and monitoring at sites where remedial action and cleanup goals have been selected.

2.1.7 Initial Characterization

Initial characterization (also called waste characterization) has been conducted before and may continue during removal activities for a given waste stream (i.e., soils, debris, etc.). The DQO process has been used to develop which waste streams are expected to be generated, the initial characterization data needs, rationale, strategy, and requirements for the data collection and analysis. Data collection could include survey and sample data. The initial characterization data will be used as follows:

- Characterize waste for removal, treatment, and/or disposal
- Identify radiological and hazardous conditions encountered during removal
- Specify health and safety requirements.

Documentation on the results of the DQO process is included in the SAP (DOE/RL-2006-50) and the SAI (D&D-24693).

2.1.8 Decontamination

Decontamination of equipment, waste containers, etc. to support excavation activities will generally be performed using dry methods (such as wiping) to the extent possible. When the use of wet methods (for example, pressure washers) is required to achieve decontamination objectives, the associated water or cleaning solutions will be collected, and work will be conducted by trained site workers in accordance with the following best management practices:

- Decontamination activities will be performed within active excavation areas of the CERCLA Removal Action Area

- The amount of water used to clean equipment will be minimized
- Only raw or potable water will be used
- Regulated soaps, detergents, or other cleaning agents will not be added to wash water
- Pressure washing will normally use cold water.

When excavation operations are completed at a given site, equipment will generally be relocated to a nearby site that will undergo remedial action, and decontamination may be performed at the new site in accordance with the best management practices. If it is not practical or efficient to relocate the equipment to a new site, equipment decontamination may be performed within the initial CERCLA Removal Action Area (Figure 1-1). In such cases, a pre- and post-survey will be performed on the washing/decontamination area to determine whether any supplemental remediation of the area is needed as a result of the process. The project may also opt to perform other methods of equipment washing and/or decontamination for a completed site (e.g., wrap the equipment for transfer to a decontamination pad, provide for a temporary facility at the site to collect wash water, or fix the contamination to the equipment). Decontamination fluid/wash water that is collected will be managed in accordance with Section 4.2, "Waste Management Plan".

2.1.9 Waste Disposal

All waste management activities will be performed in accordance with waste management ARARs identified in the Action Memorandum and as discussed in Section 4.2 of this RAWP. Solid radiologically contaminated CERCLA waste from the removal action will either be disposed of at ERDF, or temporarily stored offsite at the Central Waste Complex (CWC) prior to treatment and disposal, or liquid waste will be disposed of offsite at the 200 Areas Effluent Treatment Facility (ETF). The movement and treatment, storage, and/or disposal of waste at the CWC or the ETF require an offsite determination approval.

The CERCLA waste also could be disposed of at another offsite facility that has been approved in accordance with 40 CFR 300.400. Treatment of waste could be necessary before disposal at ERDF, and containerized waste could be stored at ERDF with the appropriate concurrence(s) while the waste is awaiting treatment. Liquid waste sent to the ETF will be treated separately from other non-CERCLA sources, and any treatment residues that meet ERDF waste acceptance criteria (WCH-191) could be disposed of at ERDF. Section 4.2 discusses waste management in further detail.

3.0 SAFETY AND HEALTH MANAGEMENT AND CONTROLS

All emergency planning and preparedness activities for this project will be consistent with planning and preparedness actions taken by other Hanford Site contractors and similar projects. Activities will be in a manner that ensures the health and safety of workers and the public and the protection of the environment in the event of an abnormal incident during removal action activities.

3.1 EMERGENCY MANAGEMENT

The contractor's Emergency Management Program (including preparedness, planning, and response) contains the administrative responsibilities for compliance with the *Hanford Emergency Response Plan* (DOE/RL-94-02) and all applicable DOE Orders. The Emergency Management Program establishes a coordinated emergency response organization capable of planning for, responding to, and recovering from industrial, security, and hazardous material incidents. Emergency action plans for contractor-managed hazardous facilities identify the capabilities necessary to respond to emergency conditions, provide guidance and instruction for initiating emergency response actions, and serve as a basis for training personnel in emergency actions for each facility.

The emergency response actions within the emergency action plan are provided for recognizing incidents and/or abnormal conditions, initiating protective actions, and making the proper notifications. Emergency response for this project will include Nuclear Regulatory Commission notification for reportable quantity releases and on-scene coordinator notification for other emergency situations.

3.2 SAFEGUARDS AND SECURITY

Access to the Hanford Site is controlled via manned guard stations. Access to the removal action area is controlled by the contractor using such things as fences and signs. Access requirements for employees, non-employees, and/or visitors are defined in D&D-34750, *Support Activities for the BC Controlled Area Removal Action Within the 200-UR-1 Operable Unit, and the BC Cribs and Trenches Within the 200-BC-1 Operable Unit, Health and Safety Plan* (HASP).

3.3 HEALTH AND SAFETY PROGRAM

The contractor's Hazardous Waste Operations Safety and Health Program was developed for employees involved in hazardous waste site activities. The program was developed to comply with the requirements of 29 CFR 1910.120 and 10 CFR 835 to ensure the safety and health of workers during hazardous waste operations.

3.3.1 Worker Safety Program

The Integrated Safety Management System will be incorporated into all work activities. The program includes the following elements:

- Organizational structure specifying the official chain of command and the overall responsibilities of supervisors and employees
- Comprehensive work plan developed before work begins at a site to identify operations and objectives and to address the logistics and resources required to accomplish project goals

- HASP developed when workers could be exposed to hazardous substances
- Worker training commensurate with individual job duties and work assignments
- Medical surveillance program administered to comply with the Occupational Safety and Health Administration requirements (29 CFR 1910.120)
- Contractor's internal work requirements and processes
- Voluntary protection program.

3.3.2 Health and Safety Plan and Activity Hazards Analysis

A HASP (D&D-34750) has been prepared that defines the chemical, radiological, and physical hazards and specifies the controls and requirements for work activities. Access and work activities are controlled in accordance with approved work packages, as required by established internal work requirements and processes. The HASP addresses the health and safety hazards of each phase of site operation and includes the requirements for hazardous waste operations and/or construction activities, as specified in 29 CFR 1910.120. As part of work package development, a job or activity hazards analysis will be written to identify the hazards associated with specific tasks already not covered under a HASP. The elements included in the HASP are as follows:

- General overview of the hazards associated with the area
- List of employee training assignments
- List of personal protective equipment (PPE) to be used at the work site
- Medical surveillance requirements
- Work site control measures
- Emergency response
- Confined space entry internal work requirements and processes
- Spill containment program.

In addition to the HASP, a radiological work permit (RWP) will be prepared, as needed, for work in areas with potential radiological hazards. The RWP extends the Radiological Protection Program (discussed in Section 3.3.3) to the specific work site or operation. All personnel assigned to the project and all work site visitors strictly must adhere to the provisions identified in the HASP and RWP.

Before work and before each activity begins, a pre-job briefing will be held with the involved workers. This briefing will include reviews of the hazards that could be encountered and the associated requirements. Throughout an activity, daily briefings also could be held, as well as special briefings before major evolutions.

3.3.3 Radiological Controls and Protection

The radiological controls and protection program is defined in DOE-approved programs and contractor-approved internal work requirements and processes. The radiological controls and protection program implements the contractor's policy to reduce risks to safety or health to levels that are ALARA and to ensure the adequate protection of workers. The contractor's radiological protection program meets the requirements of 10 CFR 835. Appropriate dosimetry, RWPs, PPE, ALARA planning, periodic surveys, and radiological control technical support also will be provided.

The standard contractor's controls for work in radiological areas are assessed as adequate to control project activities. These controls will provide for radiological controls planning to identify the specific conditions, and the controls also will govern the specific requirements for an activity, periodic radiation and contamination surveys of the work area, and periodic or continuous observation of the work by the radiological controls organization. The ALARA planning process will be used to identify shielding requirements, contamination control requirements, radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the projects.

Measures also will be taken to minimize the possibility of releases to the environment. Section 4.3 of this RAWP, quantitatively addresses the radionuclide inventory and controls which may be utilized during project activities that could prevent the potential release of the inventory, but not to the exclusion of 10 CFR 835 requirements. Therefore, monitoring will be completed as described in Section 4.3 and radiological worker exposure must also be monitored using approved occupational radiological protection methods.

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4.0 ENVIRONMENTAL MANAGEMENT AND CONTROLS

The ARARs for this removal action were identified in the Action Memorandum (DOE/RL-2008-21). A discussion of how the removal action will comply with these ARARs is provided in the following sections.

4.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

A requirement under other environmental laws may be either "applicable" or "relevant and appropriate," but not both. Identification of ARARs must be done on a site-specific basis and involves a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

To-Be-Considered (TBC) information consists of nonpromulgated advisories or guidance issued by federal or state governments that are not binding legally and do not have the status of ARARs. As appropriate, TBCs should be considered in determining the removal action necessary for protection of human health and the environment. Requirements drawn from TBCs may be included in the selected alternative. Because the alternatives would result primarily in waste generation and potential for air emissions, the key ARARs identified for the alternatives considered include waste management standards; standards controlling emissions to the environment; and environment, safety, and health standards.

The ARARs for this removal action are identified in the Action Memorandum (DOE/RL-2008-21).

4.2 WASTE MANAGEMENT PLAN

Waste management activities performed in this RAWP will be in accordance with the Action Memorandum (DOE/RL-2008-21).

The requirements specified by the ARARs and other applicable guidance are addressed in this section, including waste storage, transportation, packaging, handling, and labeling as they specifically apply to waste streams.

Treatment will be required for land disposal restriction (LDR) material unless a treatability variance or ARAR waiver is requested by DOE and approved by the regulatory agencies. If LDR wastes are encountered, the requirements of 40 CFR 268 will be applied. Should LDR material be encountered, it will be temporarily stored within the CERCLA Removal Action Area and disposed in accordance with applicable regulations. If treatment is required to address LDR wastes, DOE will obtain regulatory agency approval.

4.2.1 Projected Waste Streams

One or all of the waste streams listed below are anticipated and may fall into any combination of the following categories: radioactive, mixed, hazardous, dangerous, suspect radioactive, suspect dangerous, suspect mixed, and nonregulated:

- Miscellaneous solid waste (e.g., rubber, glass, paper, personal protective equipment, cloth, plastic, metal)
- Soils
- Equipment and construction materials (e.g., drift fences, pitfall traps, related materials and sampling equipment)
- Nondangerous/no-radiation-added (nonradioactive) solid waste (e.g., paper, wood, construction debris, metal, plastic, glass)
- Waste water from decontamination activities.

4.2.2 Waste Characterization, Designation, and Disposal

Waste from the excavation sites will be containerized (as appropriate) and transported for storage, treatment (if required), and/or disposal. Shipment of DOT hazardous materials will comply with all applicable DOE and/or DOT requirements.

Miscellaneous solid waste that has contacted contaminated media, and/or is designated as contaminated by process knowledge or other information, may be disposed at the ERDF as described above. Waste will be characterized and designated in accordance with requirements of the receiving facility and in accordance with the approved SAP (DOE-RL-2006-50). Waste will be designated using process knowledge, historical analytical data, engineering calculations, and/or analyses of samples identified in the referenced documents or SAP, as appropriate. Every effort will be made to minimize waste volume for disposal at ERDF.

The ERDF is the preferred disposal location, provided that the waste acceptance criteria are met. Waste will be staged within the CERCLA Waste Container Storage Area (Figure 4-1), or at the ERDF. Uncontaminated soils will be placed on the ground near the point of origin.

Small volumes of liquid that have been solidified may also be disposed at the ERDF if the waste meets the ERDF waste acceptance criteria. Liquid waste that does not meet the acceptance criteria will be shipped to an appropriate offsite facility such as 200 Area Effluent Treatment Facility, including any approved treatment, storage, and disposal facility, depending on the waste designation. Offsite facilities that receive contaminated waste must be deemed acceptable by the EPA in accordance with 40 CFR 300.440. Used oil will be sent offsite for recycling or disposal. Spent or unusable chemicals/reagents may also be generated during field sampling and analysis and would require disposal at the appropriate facility based on the designation.

Three categories of waste exist from a designation standpoint: (1) wastes that do not require additional characterization or special handling, (2) wastes that do not require additional characterization but do require special handling, and (3) wastes that require additional characterization:

- Wastes That Do Not Require Additional Characterization or Special Handling. Wastes that do not require additional characterization or special handling include untreated wastes, and/or process soil, that may be designated without characterization and do not require special handling for human exposure protection or waste acceptance.

- Wastes That Do Not Require Additional Characterization, But Do Require Special Handling. Wastes that do not require additional characterization but do require special handling are untreated wastes, and/or process soil, that may be designated without characterization, but do require special handling for human exposure protection or waste acceptance. Waste types in this category include, but are not limited to, high-dose, highly contaminated components that do not contain dangerous/hazardous materials.

- Wastes That Require Additional Characterization. Wastes that require additional characterization include untreated and/or treated wastes that cannot be designated without characterization and may also require special handling for human exposure protection or waste acceptance. Unknown or anomalous materials are included in this category.

4.2.2.1 Returned Sample Waste

Screening and analysis of both solids and liquids may be conducted at the waste site, offsite or onsite laboratories, and/or a radiological counting facility. Samples from a radiological counting facility and from onsite laboratories may be returned to the CERCLA Removal Action Area (refer to Figure 1-1). Unused samples and associated laboratory waste from offsite analyses will be managed by the applicable laboratory in accordance with contract specifications. Waste from field screening and onsite laboratories will be managed depending on whether it has been altered. Altered samples will be contained and disposed at ETF, ERDF, or other appropriate facilities as authorized by EPA, depending on waste designation. Unaltered liquid waste generated during sample screening and analysis that does not exceed collection criteria limits may be discharged to the ground near the point of generation; if it exceeds the collection criteria, it may be disposed at the ETF, ERDF, or other appropriate facilities. Some liquids may be neutralized and/or stabilized to meet the disposal facility's waste acceptance criteria. Pursuant to 40 CFR 300.440, EPA approval is required before unused samples or waste can be returned from offsite laboratories.

In conducting the removal action, various waste steams will be encountered. Each waste stream will require specific processing and disposal. Similar types of waste will be managed uniformly. Assignment of waste to the appropriate waste stream depends on knowing the designation of the waste and appropriate disposal facility.

4.2.2.2 Waste Size Reduction

The most current version of WCH-191, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, will be used to assure compliance with ERDF shipping requirements, including waste size reduction requirements.

4.2.2.3 Waste Handling

At each site, containers and ERDF haul trucks being released from radiologically-controlled areas will meet exterior contamination limits for staging and transport.

4.2.2.4 Waste Profile

The contractor will provide waste characterization and necessary transport papers. Waste profiling for establishing values for the waste tracking form will take place concurrently with removal action activities. Field screening measurements will be used to obtain data to adjust the waste tracking form. The waste profile will be adjusted (as necessary) through a combination of in-process field screening methods, analytical laboratory analysis, and notification of the field engineer.

Sampling and laboratory analysis of anomalous waste will be used to characterize soil and debris. The data will be used to prepare or update waste profiles, as necessary.

4.2.3 Waste Generation Management

Marking, labeling, segregation, and staging of waste containers will be performed or directed by the waste transportation specialist.

Wastes will be stored at a site-specific waste container storage area (WCSA) located near the intersection of Route 4 South and General Electric Avenue, as shown in Figure 4-1. Alternate locations may be used as excavation activities proceed.

The following sections describe types and management of expected wastes.

4.2.3.1 Miscellaneous Solid Waste

Miscellaneous solid waste that has contacted suspect dangerous or suspect mixed waste will be treated 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 from other materials in accordance with their field screening results and locations, then staged at the designated site-specific waste container storage area. The containers of miscellaneous solid waste will be dispositioned on the basis of analytical results obtained from the soil contacted in conjunction with analytical results.

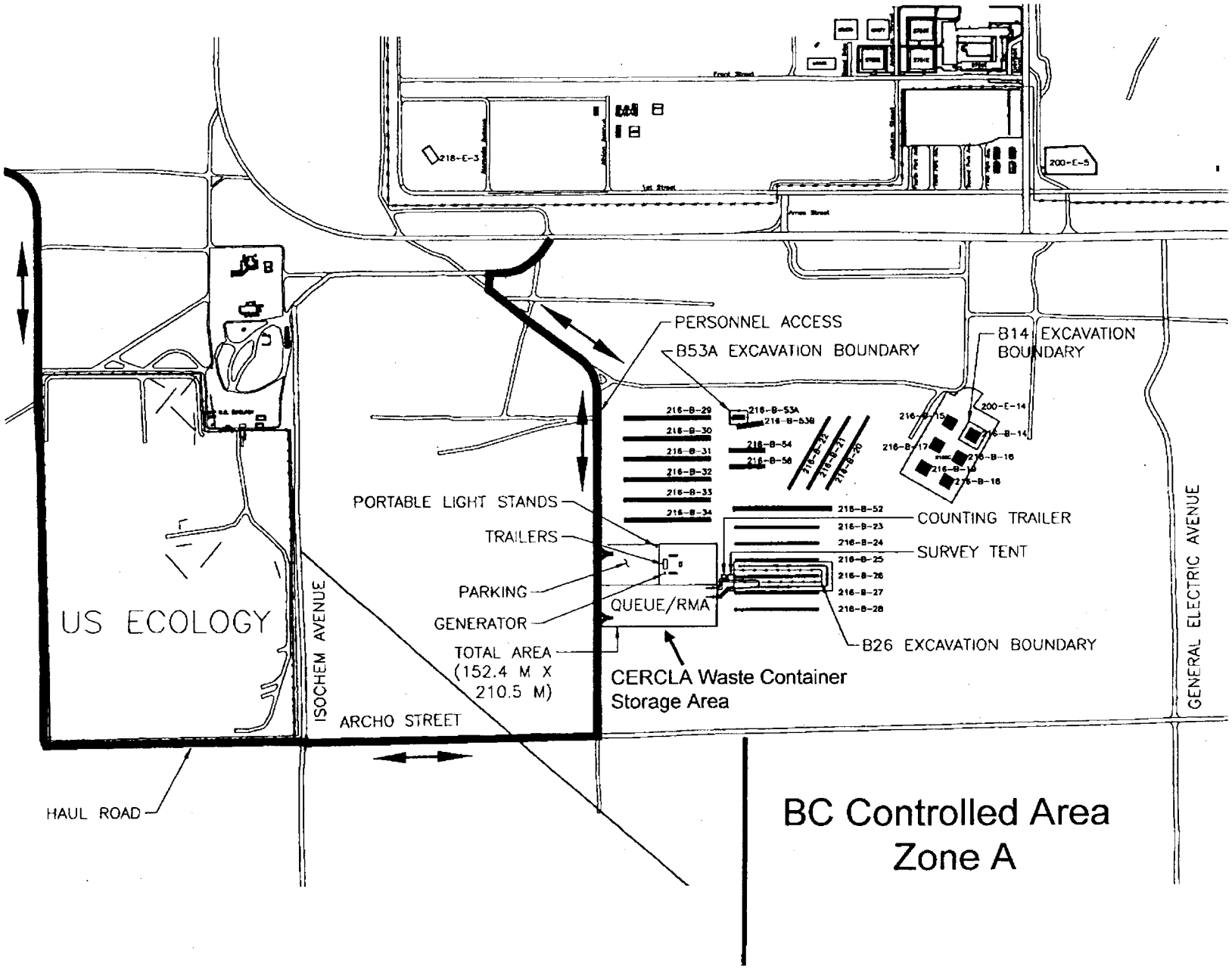


Figure 4-1. BC Controlled Area Waste Container Storage Area.

4.2.3.2 Decontamination Fluids

Decontamination fluids (water and/or nondangerous cleaning solutions) generated from cleaning equipment and tools in the removal action area will be contained, sampled, and as necessary transported, and discharged into the ETF. If necessary, decontamination fluids can be containerized, over-packed, and temporarily stored at the designated site-specific waste container storage area.

Additional chemical decontamination of sample equipment may be conducted at the Waste Sampling and Characterization Facility (WSCF) because decontamination and containment systems already are established at this location. The waste generated at WSCF is not considered CERCLA waste and will be managed in accordance with applicable regulations and requirements.

4.2.3.3 Equipment and Construction Materials

Equipment and construction materials that contact suspect dangerous and/or suspect mixed waste will be decontaminated either with a three-bucket wash or with a high-pressure wash within a wash basin capable of retaining rinsate, or will be treated as miscellaneous solid waste. All water used for decontamination activities shall be potable (that is, Hanford Site potable water). Rinsate shall be managed as described in Section 4.2.3.2. All sampling equipment shall be cleaned and decontaminated for chemical contamination after radiological release by a radiological control technician. If equipment is to be dispositioned, a declaration of excess form will be completed and the material will be containerized. If necessary, equipment and construction materials can be containerized and stored at the designated site-specific waste container storage area.

4.2.3.4 Nondangerous/No-Radiation-Added Solid Waste

All nondangerous/no-radiation-added (nonradioactive) solid waste will be radiologically released and may be disposed to an offsite solid-waste landfill consistent with standard site refuse disposal practices. This waste will not have contacted suspect dangerous or mixed waste and will not contain free liquids. Items in this category include paper, wood, construction debris, metals, plastic, glass, etc. A radiological release certification form should be attached and visible from outside the trash bag. If necessary, nondangerous/no-radiation-added solid waste can be containerized, segregated, and stored at the designated site-specific waste container storage area.

4.2.4 Management of Waste Containers

Waste containers, including ERDF roll-on/roll-off containers, are inspected prior to use to ensure the integrity of container. The containers will be stored inside the applicable site-specific waste container storage area. Containers awaiting analytical results will be marked and labeled as appropriate. Weekly inspections will be performed to document the integrity, container marking/labeling, physical container placement, storage area boundaries/identification/warning signs, and any potential leakage. Containers showing signs of deterioration will be identified on the container inspection form and will be overpacked or repackaged. Spills or releases will be reported as stated in Section 4.4. In the event of a spill or release, appropriate and immediate action will be taken to protect human health and the environment.

4.2.5 Final Disposal/Storage

All waste will be stored in the appropriate site-specific waste container storage area until the proper waste shipping papers are completed. The process for developing proper waste shipping papers includes the following: receipt of analytical results, designation, profiling, and proper disposal paperwork. The designation process ensures the waste will be profiled for the appropriate disposal facility. Waste

profiling provides information concerning each waste stream. The designation and profiling are conducted in accordance with the requirements of WAC 173-303-070, "Designation of Dangerous Waste," specifically WAC 173-303-070(3). Dangerous waste will be evaluated for applicable land disposal restrictions in accordance with WAC 173-303-140, "Land Disposal Restrictions."

Any waste that does not meet the ERDF waste acceptance criteria will remain at the designated site-specific waste container storage area pending disposal at an appropriate location or treatment to meet ERDF acceptance. A case-by-case disposal determination will be made in instances where waste exceeds the ERDF waste acceptance criteria. Any waste requiring treatment before disposal requires approval by the lead regulatory agency.

Waste above radiological release levels that meet the ERDF waste acceptance criteria will be transported to the ERDF for disposal. Nonradiologically-contaminated dangerous waste may be shipped to ERDF or to an offsite facility, contingent upon the waste meeting the offsite RCRA disposal facility's waste acceptance criteria and offsite determination of acceptability by the EPA.

Soils associated with analytical results below radiological release criteria specified in contractor specific waste acceptance/radiological release procedures, and below chemical cleanup values specified in WAC 173-340-740, "Unrestricted Land Use Soil Cleanup Standards," may be returned to the environment near the sample location.

The miscellaneous solid waste identified as nondangerous/no-radiation-added solid waste that does not require disposal at ERDF and meets the Hanford Site free-release criteria may be disposed in an appropriate solid waste disposal facility (Subtitle "D" landfill).

4.2.6 Waste Disposal Records

Original copies of all sampling records, waste inventory documentation, and waste container certification forms will be forwarded to the assigned waste specialist to be included in the waste file and to initiate waste tracking in the Solid Waste Information Tracking System. The completed waste files will be included in the project file following final waste disposition.

4.2.7 Waste Treatment

When necessary, treatment may be conducted at the site, at the ERDF (in special cases), or at an EPA-approved offsite facility. If LDR wastes are encountered, the requirements of 40 CFR 268 will be applied, unless the EPA approves a treatability variance. 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 the ERDF will require additional authorization from the EPA.

4.2.8 Waste Minimization and Recycling

By using waste separation and segregation, waste generation will be kept to a minimum. Waste will be segregated within the removal action area as generated, which will minimize the volume of regulated waste.

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

All materials released offsite for disposal/recycle must be certified free of contamination in accordance with DOE guidance for nonreal property. Waste materials with no or *de minimis* levels of CERCLA hazardous substances are not considered CERCLA waste and, therefore, are not subject to the 40 CFR 300.440 offsite acceptability determination.

4.3 STANDARDS CONTROLLING RELEASES TO THE ENVIRONMENT

4.3.1 Radiological Air Emissions

The Revised Code of Washington (RCW) 70.94, "Washington Clean Air Act," requires regulation of radioactive air pollutants. The state implementing regulation WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," sets standards that are as stringent or more so than the federal *Clean Air Act of 1990* and Amendments (42 United States Code 7401 et seq.), and under the federal implementing regulation, 40 CFR 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other than Radon from Department of Energy Facilities." EPA's partial delegation of the 40 CFR 61 authority to the State of Washington includes all substantive emissions monitoring, abatement, and reporting aspects of the federal regulation. The state standards protect the public by conservatively establishing exposure standards applicable to even the maximally exposed public individual. Under the Washington Administrative Code [WAC 246-247-030(15)], the "Maximally exposed individual" (MEI) is any member of the public (real or hypothetical) who abides or resides in an unrestricted area, and may receive the highest total effective dose equivalent (TEDE) from the emission unit(s) under consideration, taking into account all exposure pathways affected by the radioactive air emissions. All combined radionuclide airborne emissions from the DOE Hanford Site "facility" are not to exceed amounts that would cause an exposure to any member of the public of greater than 10 mrem/yr effective dose equivalent. The state implementing regulation WAC 246-247, "Radiation Protection – Air Emissions," which adopts the WAC 173-480 standards and the 40 CFR 61, Subpart H standard, requires verification of compliance with the 10 mrem/yr standard, and would potentially be applicable to the removal action.

The WAC 246-247 further addresses emission sources emitting radioactive airborne emissions by requiring monitoring of such sources. Such monitoring requires physical measurement of the effluent or ambient air. The substantive provisions of WAC 246-247 that require monitoring of radioactive airborne emissions would be applicable to the removal action.

The above state implementing regulations further address control of radioactive airborne emissions where economically and technologically feasible (WAC 246-247-040(3) and -040(4), "Radiation Protection - Air Emissions," "General Standards," and associated definitions). To address the substantive aspect of these requirements, best or reasonably achieved control technology will be addressed by ensuring that applicable emission control technologies (those successfully operated in similar applications) will be used when economically and technologically feasible (i.e., based on cost/benefit). If it is determined that there are substantive aspects of the requirement for control of radioactive airborne emissions, then controls will be administered as appropriate using reasonable and effective methods.

4.3.2 Criteria/Toxic Air Emissions

Under WAC 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," requirements are established for the regulation of emissions of criteria/toxic air pollutants. The primary nonradioactive emissions resulting from this removal action will be fugitive particulate matter. In accordance with WAC 173-400-040, "General Standards for Maximum Emissions," reasonable precautions must be taken to (1) prevent the release of air contaminants associated with fugitive emissions resulting from excavation, materials handling, or other operations; and (2) prevent

fugitive dust from becoming airborne from fugitive sources of emissions. The use of treatment technologies that would result in emissions of toxic air pollutants that would be subject to the substantive applicable requirements of WAC 173-460 are not anticipated to be a part of this removal action. Treatment of some waste encountered during the removal action may be required to meet ERDF waste acceptance criteria. In most cases, the type of treatment anticipated would consist of solidification/stabilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an ARAR. If more aggressive treatment is required that would result in the emission of regulated air pollutants, the substantive requirements of WAC 173-400-113(2) and WAC 173-460-060 would be evaluated to determine applicability.

Emissions to the air will be minimized during implementation of the removal action through use of standard industry practices such as the application of water sprays and fixatives. These techniques are considered to be reasonable precautions to control fugitive emissions as required by the regulatory standards.

4.3.3 Radiological Airborne Source Information

The total potential fugitive emissions were calculated for the removal action activities identified Section 1.3.

There is a potential for particulate radioactive airborne emissions to result from the removal action activities. The primary radionuclides detected within the site, at this time, include Cs-137, Pu-239/240 and Sr-90. Other radionuclides listed in Table 1-1 may also be encountered during the removal action activities. However, they have not been detected to date. Emissions and dose information related to the excavation activity are provided in Table 4-1. The estimates shown for abated emissions very conservatively assume no abatement affect. Therefore, the Abated and Unabated estimates are listed as the same.

Table 4-1. Dose Calculations for Excavation Activities.

Nuclide	Radionuclide Inventory (Ci)[a]	40 CFR 61, Appendix D, Release Factor	Abated and Unabated Release Rate (Ci/yr)	200 East Area <40 m Dose-per-Unit Release Factor (mrem/Ci)	Unabated and Abated Dose to MEI (mrem/yr)
Pu-239/240	8.3E-01	1.0E-03	8.3E-04	9.5E+00	7.9E-03
Cs-137	1.0E+03	1.0E-03	1.0E+00	2.0E-03	2.0E-03
Sr-90	1.5E+03	1.0E-03	1.5E+00	9.5E-03	1.4E-02
				TEDE Totals:	**2.4E-02**

[a] Radionuclide inventory includes curies currently present in the BC Controlled Area Soil. BHI-01319, 1999, *Data Assessment Report for the Sampling and Analysis Activities Conducted to Support Reposting the 200 B/C Contaminated Area*. Estimated 372,000 cubic yards of soil to be excavated with a soil density of 1,570 kg/m^3.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutants."

MEI = maximally exposed individual.
TEDE = total effective dose equivalent.

The distance to the Laser Interferometer Gravitational Wave Observatory receptor is 16,630 m east-southeast of the 200 East Area. This is the nearest public location where the hypothetical maximally exposed individual (MEI) might be located. Dose factors used specific to this location were taken from *Calculating Potential-to-Emit Radiological Releases and Doses*, DOE/RL-2006-29. The total unabated and abated potential-to-emit to the receptor from the removal action activities is 2.4E-02 mrem/yr.

4.3.4 Emission Controls

Due to the simple nature of the removal action, no elaborate best available radiological control technology (BARCT) analysis was performed in regards to potential emissions in this work plan. In general, the BARCT evaluation for an outdoor, shallow, relatively short-term removal action supports using proven technology on a cost/benefit basis. 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 any excavation and backfilling activities, for suppression of fugitive emissions and dust.

- Fixatives will be applied to contaminated soil and/or debris and equipment, as needed, to minimize airborne contamination during the removal action activities for fugitive emissions and dust. Fixative application techniques may include spraying, brushing on, pouring or some other method, as necessary.

- Fixatives or cover material (e.g., soil, gravel, etc.) will be applied to disturbed contaminated soils, associated with the investigative action, when field activities will be inactive more than 24 hours except as noted in the next bullet.

- If the sustained wind speed is predicted overnight to be greater than 32 km/hr (20 mph) based on the Hanford Meteorological Station afternoon forecast, fixative or cover material will also be applied, as needed prior to occurrence of the predicted winds. This will allow the project enough time, if necessary, to prepare for the application of dust control measures. If a fixative has already been applied and the fixed contaminated items will remain undisturbed, further use of fixatives will not be needed. The fixatives or other controls will not be applied when the contaminated items are frozen, or it is raining, snowing, or other freezing precipitation is falling at the end of work operations.

- Field activities should be temporarily ceased and the area should be placed in a safe configuration if contamination control measures are not adequate, based on site conditions (e.g., excessive wind).

- The waste packages will remain closed, except during packaging and waste inspection activities, once they are staged, but within the CERCLA Waste Container Storage Area.

- Operational limits for removable or transferable contamination levels will be established in the activity work packages and associated radiation work plans. Fixatives or other controls will be employed if removable or transferable contamination levels (other than specks of contamination) above 100,000 disintegrations per minute per 100 square centimeters beta/gamma or exceeding 2,000 disintegrations per minute per 100 square centimeters alpha are measured or expected.

4.3.5 Monitoring

The calculated unabated annual dose combined for all related activities during the removal action is below 0.1 mrem/year; therefore, this activity is not subject to continuous emissions monitoring as required byWAC 246-247-075(1). Periodic confirmatory measurement will be provided, however, as required by WAC 246-247-075(3) and (8). Alternative monitoring techniques have been considered and near-facility monitors and radiological surveys are sufficient to meet the periodic confirmatory measurement requirement.

Near-Facility Monitoring Stations N572 and N573 and PNNL 7, referred to as 200 ESE (Figure 4-2), will be utilized for the investigative activities. The Hanford Site protocol established for near-facility monitors will be followed for data collection, sampling frequencies, sample analysis, and data reporting (*Environmental Monitoring Plan*, DOE/RL-91-50, or latest revision).

Air monitor downtime will be minimized and all three designated air monitors shall be operated, as required. However, if a designated air monitor is out of operation for more than 48 hours during normal work operations (excluding weekends and holidays, when work activities are not being conducted), where there is a potential for radiological emissions, the DOE-RL and Ecology will be notified. If two or more designated air monitors are out of operation during normal work operations, activities where there is a potential for radiological emissions shall be temporarily suspended until operation of at least two designated air monitors is restored or backup equipment is deployed and operational.

Additional monitoring for diffuse and fugitive emissions will be conducted and will consist of radiological surveys using hand-held instruments at the excavation activities. Both alpha and beta/gamma surveys will be performed for all removable contamination surveys and for soil surveys (direct readings).

Excavation activities will be stopped if removable or transferable contamination (other than specks of contamination) with detection readings greater than 500,000 disintegrations per minute per 100 square centimeters beta/gamma or greater than 28,000 disintegrations per minute per 100 square centimeters alpha is encountered on the soil outside of active work areas posted for contamination control. The size of the posted area at any one time will be minimized to facilitate contamination control and the area stabilized. Excavation in that area will not continue until an internal review of the work and encountered conditions has been performed and an internal determination has been made that no threat to personnel safety or the environmental exists, or until proper controls (i.e., removal and disposal, water, fixatives, or covers) have been put in place to mitigate any further potential for emissions, and Ecology and DOE-RL have been contacted and briefed of the situation.

4.4 REPORTING REQUIREMENTS FOR NONROUTINE RELEASES

The following reporting requirements apply for hazardous substances that could be released during the removal action activities.

4.4.1 Federal Hazardous Substance

40 CFR 302 requires immediate notification to the National Response Center on discovery of a release of a hazardous substance into the environment in excess of a reportable quantity.

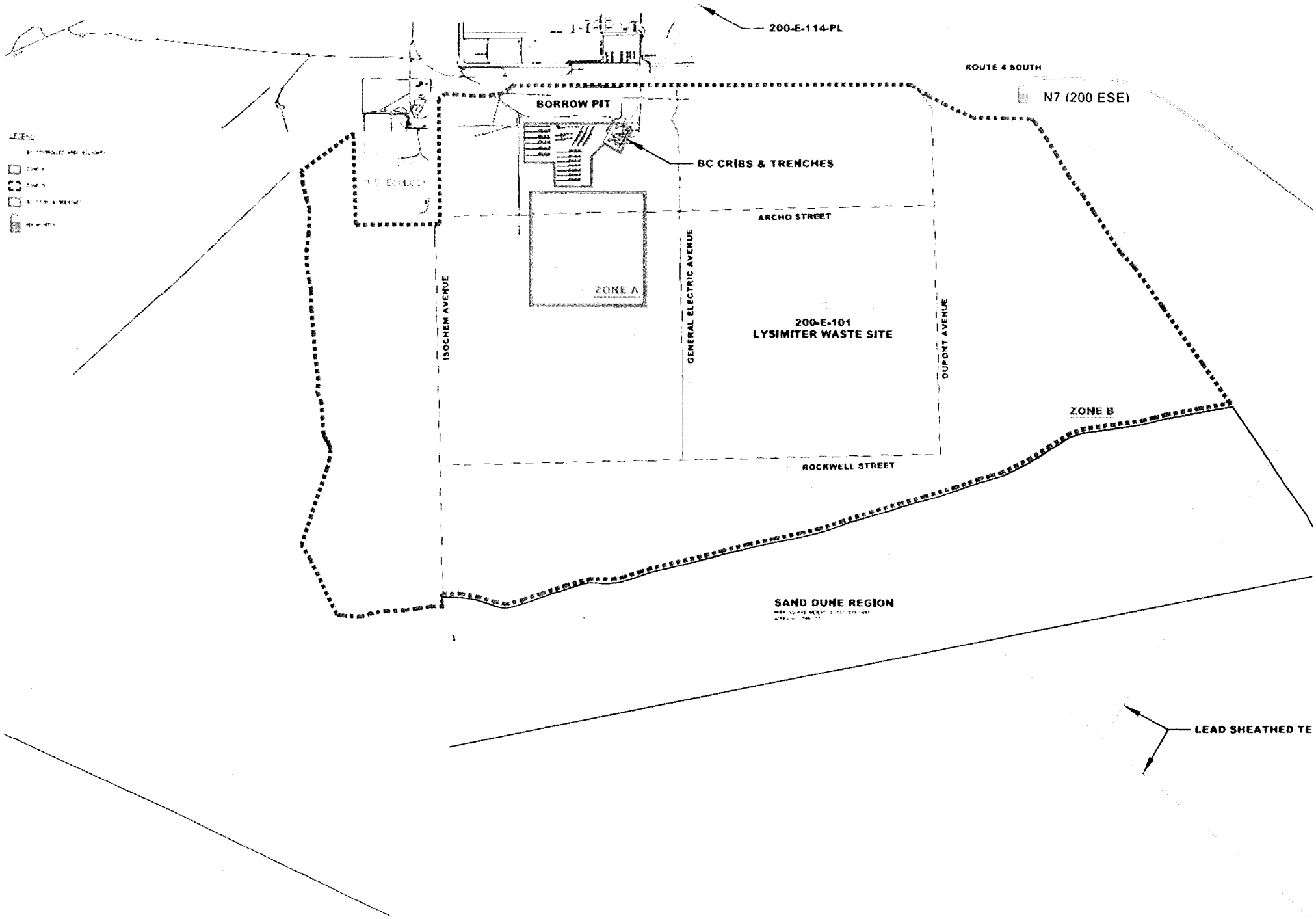
40 CFR 355 requires immediate notification to the community emergency coordinator for the local emergency planning committee and to the State Emergency Response Commission for a release of a reportable quantity of an extremely hazardous substance, a comprehensive release of a reportable quantity of an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

4.5 RELEASE OF PROPERTY

All property released for offsite disposal and/or reuse and recycle is nonreal property. The release of nonreal property will follow DOE guidance. If the property meets the surface contamination limits based on radiological surveys and/or characterization information, and the person or entity receiving the property is aware of the measured radioactivity on the property, the property could be dispositioned with low-levels of residual radioactivity. Property released via this process will be viewed as containing no or *de minimis* levels of CERCLA hazardous substances, and therefore will not be subject to CERCLA.

4.6 CULTURAL, HISTORICAL, AND ECOLOGICAL RESOURCE PROTECTION STANDARDS

Cultural and ecological resource reviews will be performed before starting the removal action activities in the areas where work will be conducted to identify any potential impacts. The cultural and ecological resource reviews will be conducted in accordance with DOE requirements. If potential impacts are discovered by these reviews, an appropriate mitigation plan will be developed and implemented.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N7 (200 ESE)
BORROW PIT
BC CRIBS & TRENCHES
ARCHO STREET
ZONE A
ISOCHEM AVENUE
GENERAL ELECTRIC AVENUE
200-E-101
LYSIMITER WASTE SITE
DUPONT AVENUE
ZONE B
ROCKWELL STREET
SAND DUNE REGION
LEAD SHEATHED TE

5.0 PROJECT ADMINISTRATION

5.1 PROJECT SCHEDULE AND COST ESTIMATE

The BC Controlled Area removal action will be scheduled and estimated using the contractor's hierarchy of schedules, which include activity logic and restraints.

Activities will be resource-loaded for personnel. Equipment needs will be identified and other materials estimated and included in the budgeted cost of work scheduled.

Estimates of project costs will be prepared at the activity level by the project team and subsequently will be reviewed and approved by the contractor and the DOE. Cost collection will occur at the code of account level.

The schedule, which encompasses the work scope of the BC Controlled Area removal action (beginning in fiscal year 2008) is included in Appendix A. The schedule included in this document also will be subject to change to be compliant with the funding of continued work for the removal action.

5.1.1 Project Cost and Schedule Tracking

Performance measurement and analysis will be performed by the contractor. Project cost and schedule will be controlled and updated using the contractor's project management system.

An earned-value system will track the cost, schedule, and performance as the project progresses towards completion. Cost/schedule performance reports will provide budgeted cost of work-scheduled comparisons and budgeted costs of work performed against the actual cost of work performed. These reports will provide variances to the baseline schedule and cost as budgeted. Variances above threshold values will be documented, as well as the rationale for the variance(s) and any recovery plan required.

Trends and baseline change proposals readily will be identified through the contractor's formal trend and change control program. All changes that affect the baseline will be documented. The contractor's trend register, which will be reviewed monthly by contractor senior management, categorizes trends from conception to final resolution. Trends will be identified as either performance trends or scope trends and will be defined further as resolved or unresolved.

Fiscal year project staffing, as budgeted, will be reconciled monthly during project review meetings to the actual number of full-time-equivalent personnel used during the month. Likewise, the corresponding number of hours actually worked will be presented and compared to the budgeted current work plan. Actual overtime will be monitored monthly (by department) and will be reconciled to the current budgeted overtime.

Cost and schedule variances to the current budget will be tracked monthly and on a to-date basis and will be reconciled back to the cause of the variance. Project impacts because of the cost and/or schedule variance will be described and corrective actions identified and tracked to the point of final resolution.

5.2 CHANGE MANAGEMENT/CONFIGURATION CONTROL

There are three types of changes in the BC Controlled Area removal action that could affect compliance with the requirements in the Action Memorandum (DOE/RL-2008-21): (1) a nonsignificant or minor

change, (2) a significant change to a component of the alternative, and (3) a fundamental change to the overall alternative.

A nonsignificant or minor change falls within the normal scope of changes occurring during the removal action processes. These minor changes should be documented in the appropriate post-decision project file (for example, through inter-office memoranda or log-books). Nonsignificant changes shall not impact the requirements of the Action Memorandum (DOE/RL-2008-21); nor will they impact the functional requirements. An example of nonsignificant changes may include, but are not limited to, the following:

- Modifications to the removal action schedule that do not impact agreed-upon milestones.

It may be determined that a significant change to the selected alternative as described in the Action Memorandum (DOE/RL-2008-21) is necessary after the Action Memorandum has been signed. Significant changes are defined as changes that significantly modify the scope, performance, or component cost for the alternative as presented in the Action Memorandum. All significant changes will be addressed in a fact sheet. Examples of significant changes may include, but are not limited to, the following:

- A significant increase or decrease in the total cost of site removal action (greater than +50 percent or more than –30 percent) addressed in the Action Memorandum (DOE/RL-2008-21)

- A significant delay in the point in time when the removal action or objectives are met.

A fundamental change is a change that does not meet the requirements set forth in the Action Memorandum (DOE/RL-2008-21) or that incorporates removal activities not defined in the scope of the Action Memorandum. In few cases are there fundamental changes to an action memorandum. Should the situation arise, the action memorandum must be amended. Significant changes that fundamentally alter the alternative occur when the following situation arises:

- A land use is defined that is not compatible with the Action Memorandum (DOE/RL-2008-21).

Determining the significance of the change is the lead regulatory agency's responsibility. The project manager is responsible for tracking all changes and obtaining appropriate reviews by staff. The project manager will discuss the change with DOE-RL, and DOE-RL will then discuss the type of change that is necessary with Ecology up to and including the Tri-Party Agreement Action Plan, Section 9.3 or 12.0 changes. Appropriate documentation will follow, in accordance with the requirements for that type of change.

5.3 PERSONNEL TRAINING AND QUALIFICATIONS

During the performance of project activities, the experience and capabilities of the operating staff will be extremely important in maintaining worker and environmental safety. Day-to-day knowledge of ongoing operations, month-to-month understanding of conditions encountered, and lessons learned will be utilized for continued safe operations.

Training requirements will ensure that personnel have been instructed in the technologies to work safely in and around radiological areas, and to maintain their individual radiation exposure and the radiation exposures of others ALARA. Standardized core courses and training material will be presented, and site-specific information and technologies will be added to adequately train workers. Records of required training will be maintained in accessible files.

Health physics workers will be required to have completed and be current in radiological control technician qualification training. These training courses require the successful completion of examinations to demonstrate understanding of theoretical and classroom material.

Specialized training will be provided as needed to instruct workers in the use of nonstandard equipment, in the performance of abnormal operations, and in the hazards of specific activities.

Specialized training could be provided by on-the-job training activities, classroom instruction and testing, or pre-job briefings. The depth of training in any discipline will be commensurate with the degree of the hazard(s) involved and the knowledge required for task performance.

Some activities will require the acquisition of expert services as opposed to project staff training.

The contractor Training Program will provide workers with the knowledge and skills necessary to safely execute assigned duties. A graded approach will be used to ensure that workers receive a level of training commensurate with their responsibility that complies with applicable requirements. Specialized employee training will include pre-job safety briefings, plan-of-the-day meetings, and facility/work site orientations. Training and qualifications will be determined as required by job assignment for work activities.

The HASP, RWP, and activity hazards analysis will include specific requirements for project activities being conducted, which will include PPE and required training for project personnel.

5.4 QUALITY ASSURANCE REQUIREMENTS

Overall quality assurance for the RAWP will be planned and implemented in accordance with 10 CFR 830, Subpart A, *Quality Assurance Requirements, EPA Requirements for Quality Assurance Project Plans* (EPA QA/R-5) (EPA 2001) and *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA/SW-846) (EPA 1999b). The quality assurance activities will use a graded approach based on the potential impact on the environment, safety, health, reliability, and continuity of operations. The SAP (DOE/RL-2006-50) also contains a quality assurance project plan, which is used to support the sampling and characterization activities. Other specific activities will include quality assurance implementation, responsibilities and authority, document control, quality assurance records, and audits. These activities are discussed in the following sections.

The Hanford Site protocol established for near-facility air monitors will be followed for quality assurance related to operation of the monitoring stations identified in this RAWP, and handling/analysis of samples from same.

5.4.1 Best Management Practices / Quality Control

Removal action quality control shall be performed in accordance with contractor's best management practices and established quality control program. Such a program will include the following:

- A summary of responsibilities and authorities of all organizations and key personnel involved in the design and construction of site removal action

- The qualifications of the quality assurance personnel to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities

- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications

- Descriptions of the reporting requirements for quality assurance activities (including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation) and descriptions of the provisions for the final storage of all records consistent with overall requirements of the contractor's records management program.

5.5 POST-REMOVAL ACTION ACTIVITIES

Post-removal action activities for the BC Controlled Area include sample collection, demonstration of attainment of RAOs, and cleanup documentation, site closure as summarized in the following subsections.

5.5.1 Post-Removal Action Sample Collection

Verification samples of the residual soil from the excavated site will be collected in accordance with an approved sampling and analysis plan. Results from samples collected will be used to demonstrate attainment of the RAOs. Data packages will be submitted to the Administrative Record.

5.5.2 CERCLA Cleanup Documentation

After completion of the removal action activities described in Section 1.3 of this RAWP, an On-Scene Coordinator Report will be completed for use in future remedial actions and to support the eventual deletion of the waste site from the NPL. The report will be placed in the administrative record.

At a minimum, the following documentation is required for the BC Controlled Area.

- Description of current waste site condition;
- Basis for reclassification; and
- Analytical data or data references (if applicable).

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APPENDIX A

SCHEDULE FOR BC CONTROLLED AREA REMOVAL ACTION

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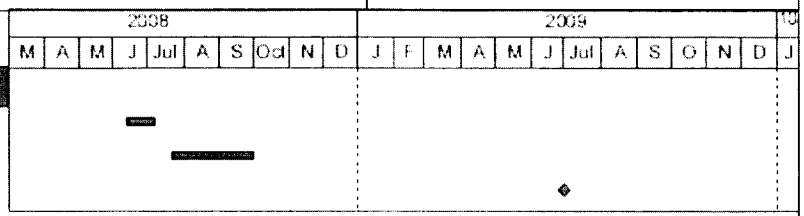
FLUOR HANFORD COMPANY

31-Jul-08

Activity ID	Activity Name	Baseline Start	Baseline Finish
BC Control Area Excavation		**13-Jun-08**	**30-Jun-09**
BC0320	Complete Mobilization for BC Control Area	13-Jun-08	07-Jul-08
BC0340	BC Control Area Excavation - FY08	21-Jul-08	30-Sep-08
BC0399	Update RAWP Schedule for BC Control Area		30-Jun-09*



Current Bar
◆ Milestone

BC Control Area
Removal Action Schedule
Page 1 of 1

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DOE/RL-2008-22
Revision 0

Removal Action Work Plan for the Northern Part of the BC Controlled Area (UPR-200-E-83) Located Within the 200-UR-1 Operable Unit

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

United States Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release.
Further Dissemination Unlimited