

## ACTION MEMORANDUM FOR THE NON-TIME-CRITICAL REMOVAL ACTION FOR THE 100-K AREA ANCILLARY FACILITIES

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### 1.0 PURPOSE AND SCOPE

**EDMC** The purpose of this action memorandum is to document approval of the non-time-critical removal action described herein for 27 buildings and structures located in the northern section of the 100-K Area of the Hanford Site.

The proposed removal action to be implemented for the 27 buildings and structures (subsequently referred to as facilities<sup>1</sup>) in the 100-K Area is outlined in the *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities (EE/CA)* (DOE-RL 2004), which was prepared by the U.S. Department of Energy (DOE). The preferred removal action identified in the proposal was to deactivate, decontaminate, and demolish the buildings. Waste generated from the removal action that meets Environmental Restoration Disposal Facility (ERDF) waste acceptance criteria will be disposed at ERDF.

This removal action minimizes the potential for a release of hazardous substances<sup>2</sup> from the facilities (listed in Appendix A) that could adversely impact human health and the environment; is protective of human health, including the site personnel, and the environment; and contributes to the efficient performance of any remedial actions, including any future subsurface soil remediation. The action includes building contents, above-ground structures, on-grade floor slabs, and the below-grade foundations and piping.

A 30-day public comment and review period for the subject EE/CA was held from October 20, 2004, through November 19, 2004. The comment period was used to evaluate removal action alternatives for the 27 facilities presented in the EE/CA as well as the facility-specific information available in the Administrative Record. Most of the comments received supported implementation of this action. The comments and responses are provided in Appendix A.

### 2.0 SITE CONDITIONS AND BACKGROUND

The 100-K Area is the portion of the 100 Area that contains the 105-KE and 105-KW Reactor buildings and supporting facilities. The area is subdivided into three operable units (OUs) to address cleanup of the soil and groundwater contamination that resulted from past operations.

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<sup>1</sup> The term "facility" is used generically to encompass all the surface and subsurface structures, buildings, foundations, piping, ducting, etc., associated with the facility.

<sup>2</sup> "Hazardous substances" means those substances defined by the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, Section 101(14), and includes both radioactive and chemical substances.

The 100-KR-1 and 100-KR-2 OUs encompass soil waste sites such as liquid waste disposal sites and solid waste burial grounds and contaminated buildings and structures. The 100-KR-4 OU addresses groundwater contamination underlying the 100-K Area. Geographically, the facilities addressed in this removal action are co-located with the 100-KR-1 and 100-KR-2 OU waste sites identified in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989).

Approximately 27 facilities are located within the 100-K Area. Many of these 27 facilities are empty, while other facilities are used to support cleanout of the 105-KE and 105-KW fuel storage basins (K Basins) or landlord activities for the 100-K Area. The schedule for completion of these other 100-K Area activities such as at the K Basins affects the schedule for the work under this action memorandum. Years of reactor operations and support activities in the 100-K Area have left the facilities contaminated.

The K Basins, located respectively inside of the 105-KE and 105-KW Reactor buildings, have been the storage locations for the majority of the Hanford Site's spent nuclear fuel since the 1970s. In addition to spent nuclear fuel, the basins contain contaminated sludge, water, and debris. The basins are included in the 100-KR-2 OU. The K Basins cleanout is being conducted as an interim remedial action under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The record of decision (ROD) authorizing the cleanout (EPA 1999) requires the DOE to remove the spent nuclear fuel, sludge, water, and debris from the basins and then deactivate the basins. With the exception of some fuel scraps and yet-to-be found fuel, all other spent nuclear fuel was removed by October 2004. Sludge, water, and debris removal, decontamination, and deactivation and removal of the basins are anticipated to be complete by 2009. The K Basins themselves are not within the scope of this action memorandum.

## 2.1 BACKGROUND

The Hanford Site is a 1,517-km<sup>2</sup> (586-mi<sup>2</sup>) federal facility located in southeastern Washington State, along the Columbia River, and operated by the DOE. From 1943 to 1990, the primary mission of the Hanford Site was the production of nuclear materials for national defense. The 100 Area is the site of nine surplus nuclear reactors and associated support facilities that were constructed and operated to produce weapons-grade plutonium. Past operations, disposal practices, spills, and unplanned releases resulted in contamination of the facility structures, underlying soil, solid and liquid waste disposal sites, and underlying groundwater in the 100 Areas. Consequently, in November 1989, the 100 Area was one of four areas of the Hanford Site that was placed on the U.S. Environmental Protection Agency's (EPA) National Priorities List under CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*.

Construction of the 105-KE and 105-KW Reactor areas began in 1952 as part of the "Project X" expansion program. Completion of the reactors was accomplished in 27 months from beginning to end. Startup of the reactors began in 1955. Operations were discontinued in 1970 for the 105-KW Reactor and in 1971 for the 105-KE Reactor. Most of the support buildings were deactivated when the reactors were shut down. However, several buildings including the fuel storage basins in the reactor buildings, the alum tanks adjacent to the 183.1-KE facility, research and development conducted in the 1706-KE Building, one river-water pumphouse, one water

treatment facility, and septic tanks and drain fields used for sanitary waste remained in service in support of the fuel storage activities.

Public access to the Hanford Site, including the 100-K Area, is currently restricted. Current land use in the 100-K Area consists of environmental cleanup activities, including removal of materials from the fuel storage basins, and eventual removal of the basin structures. Adjacent to and north of the 100-K Area, the Columbia River is accessible to the public for recreational use (e.g., boating and sport fishing). The river segment located north of the 100-K Area (referred to as the Hanford Reach) received National Monument status in 2000 (65 *Federal Register* 37253). The *Final Comprehensive Land Use Plan Environmental Impact Statement* (DOE 1999) identifies the probable future land use for the 100 Areas as preservation/conservation.

## 2.2 FACILITY DESCRIPTION

The 27 facilities addressed in this removal action include a combination of support facilities, storage buildings, shops, and offices. Several of the facilities are situated over or adjacent to contaminated soil waste sites that require remediation in accordance with the existing RODs. Spread of contamination from the facilities (e.g., animal intrusion, facility deterioration) can result in further contamination of the underlying soils. Table 1 contains a list of the facilities included in this removal action and any 100-KR-1 or 100-KR-2 OU waste sites that are present beneath and/or adjacent to the facilities.

Five of the facilities included in the scope of the removal action are eligible for listing in the National Register of Historic Places (Register) as contributing properties within the Hanford Site Manhattan Project and Cold War Era Historic District. These facilities are listed in Table 1. Physical effects to these eligible properties, up to and including demolition, have been mitigated. The contents of these eligible properties were evaluated to identify artifacts that may have interpretive or educational value. These artifacts will need to be retrieved and transported to an appropriate curative facility before any demolition activities occur.

Figure 1 shows the location of the ancillary facilities in the 100-K Area. A brief description and history of each facility can be found in DOE-RL (2004). Figure 2 shows the location of potentially impacted adjacent waste sites for the facilities located in the western portion of 100-K Area. Figure 3 shows the location of potentially impacted adjacent waste sites for the facilities located in the eastern portion of 100-K Area.

**Table 1. Facilities Included in the Scope of the Removal Action and Potentially Impacted 100-KR-1/100-KR-2 Operable Unit Waste Sites. (2 Pages)**

Facility Number	Facility Name	Potentially Impacted Adjacent Waste Sites
110-KW	Gas Storage	116-KW-1 (Condensate Crib)
115-KW	Gas Recirculation Building	116-KW-1 (Condensate Crib)
116-KW	Reactor Stack <sup>a</sup>	130-KW-1 (105-KW Emergency Diesel Oil Storage Tank), 100-K-1 (Sample Building French Drain), 100-K-54 (Glycol Heat Recovery Pipelines), 100-K-59 (Service Water Pipelines)
117-KW	Exhaust Air Filter Building <sup>a</sup>	116-KW-1 (Condensate Crib), 100-K-47 (Process Sewer)
118-KW-2	Horizontal Control Rod Storage Cave	
119-KW	Exhaust Air Sampling Building <sup>a</sup>	100-K-1 (Exhaust Air Sampling Building French Drain)
166-KW	Oil Storage Vault	130-KW-2 (Oil Storage Tank), 100-K-13 (French Drain), 120-KW-6 (165-KW Brine Pit), 100-K-59 (Service Water Pipelines), 100-K-49 (100-KW Oil Contamination Area)
183-KW	Chlorine Car Protection Building	100-K-34 (Acid Neutralization Pit), 1607-K3 (Septic Tank and Drainfield)
183.1-KW	Headhouse <sup>a</sup>	120-KW-2 (183-KW Filter Facility French Drain), 120-KW-3 (Sulfuric Acid Storage Tank), 120-KW-4 (Sulfuric Acid Storage Tank), 120-KW-5 (Sodium Dichromate Storage Tank), 120-KW-7 (Brine Pit and Pump Pit), 100-K-18 (Caustic Neutralization Pit), 100-K-19 (Caustic Soda Storage Tank), 100-K-32 & 100-K-33 (Sulfuric Acid Tank Site), 100-K-34 (Acid Neutralization Pit), 100-K-59 (Service Water Pipelines)
183.2-KW	Sedimentation Basins	
183.3-KW	Filter Basin	
183.4-KW	Reservoir and Clearwells	
183.5-KW	Lime Feeder Building	
183.6-KW	Lime Feeder Building	
183.7-KW	Pipe Tunnel	
190-KW	Process Water Pumphouse <sup>a</sup>	100-K-59 (Service Water Pipelines)
110-KE	Gas Storage	116-KE-1 (Condensate Crib)
115-KE	Gas Recirculation Building	116-KE-1 (Condensate Crib), 100-K-6 (Vacuum Pit), 130-KE-1 (105-KE Emergency Diesel Oil Tank), 100-K-46 (119-KE French Drain), 100-K-53 (Glycol Heat Recovery Pipelines), 100-K-58 (Service Water Pipeline)
116-KE	Reactor Stack	100-K-6 (Vacuum Pit), 130-KE-1 (105-KE Emergency Diesel Oil Tank), 100-K-46 (119-KE French Drain), 100-K-47 (Process Sewer), 100-K-53 (Glycol Heat Recovery Pipelines), 100-K-58 (Service Water Pipeline)

**Table 1. Facilities Included in the Scope of the Removal Action and Potentially Impacted 100-KR-1/100-KR-2 Operable Unit Waste Sites. (2 Pages)**

Facility Number	Facility Name	Potentially Impacted Adjacent Waste Sites
117-KE	Exhaust Air Filter Building	116-KE-1 (Condensate Crib), 100-K-46 (119-KE French Drain), 100-K-47 (Process Sewer), 100-K-53 (Glycol Heat Recovery Pipelines), 100-K-58 (Service Water Pipeline)
118-KE-2	Horizontal Control Rod Storage Cave	
166-KE	Oil Storage Vault	130-KE-2 (Oil Storage Tank), 100-K-48 (100 KE Oil Contamination Areas), 100-K-58 (Service Water Pipelines), 120-KE-8 (Brine Pit)
1614-KE	Environmental Monitoring Station	
182-K	Emergency Water Pumphouse *	100-K-58 (Service Water Pipeline)
1701-K	Patrol Headquarters	600-29 (Surface Chemical Dumping), 1607-K1 (Septic Tank and Drainfield), 100-K-58 (Service Water Pipeline)
1720-K	Office and Telephone Exchange	600-29 (Surface Chemical Dumping), 1607-K1 (Septic Tank and Drainfield), 100-K-58 (Service Water Pipeline)
1909-K	Effluent Valve Pits	

\* Indicates the associated facility qualifies for consideration as a historically significant property under the *National Historic Preservation Act of 1966*.

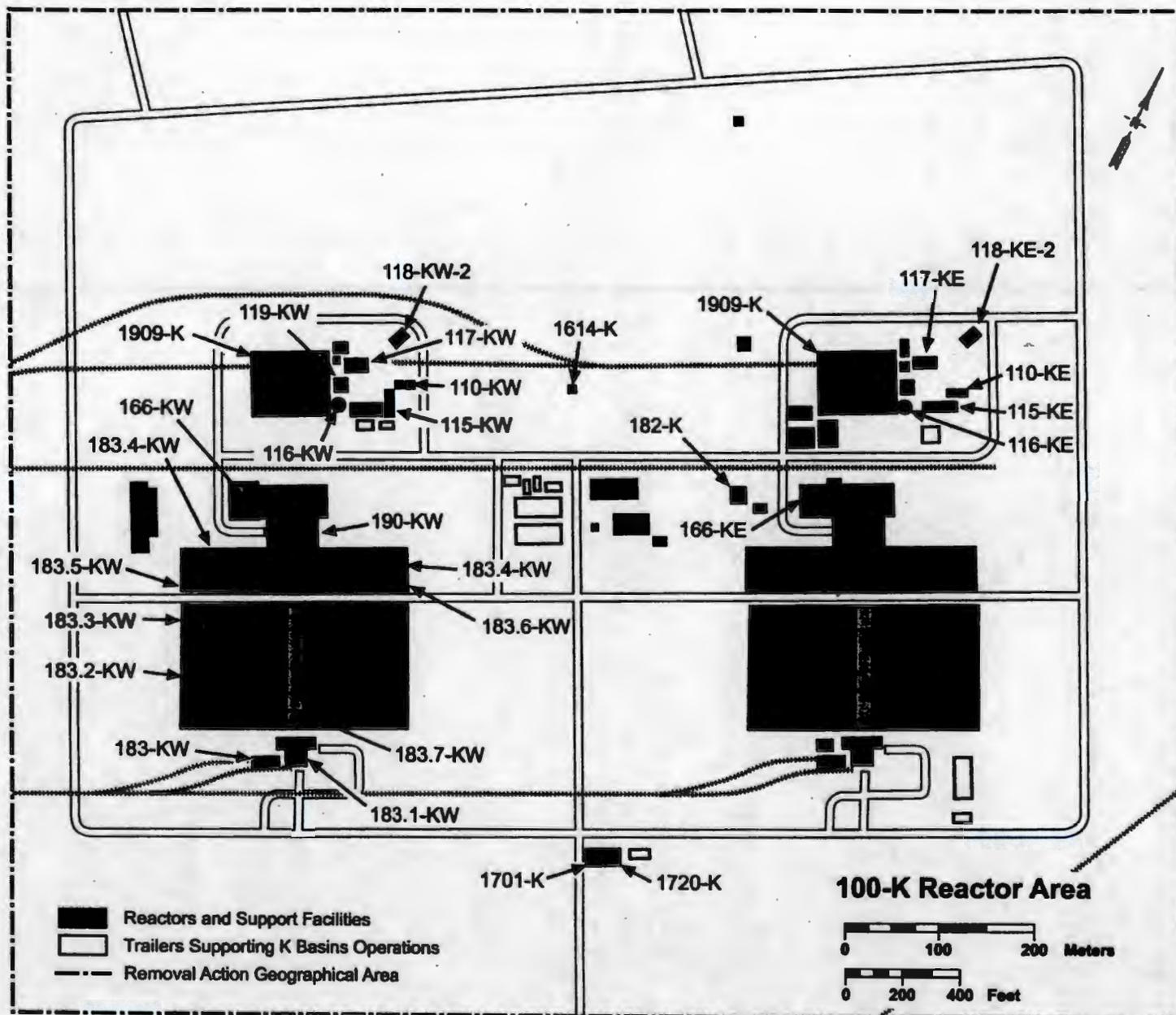
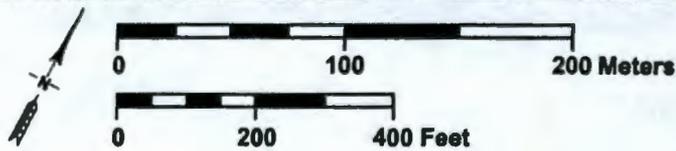
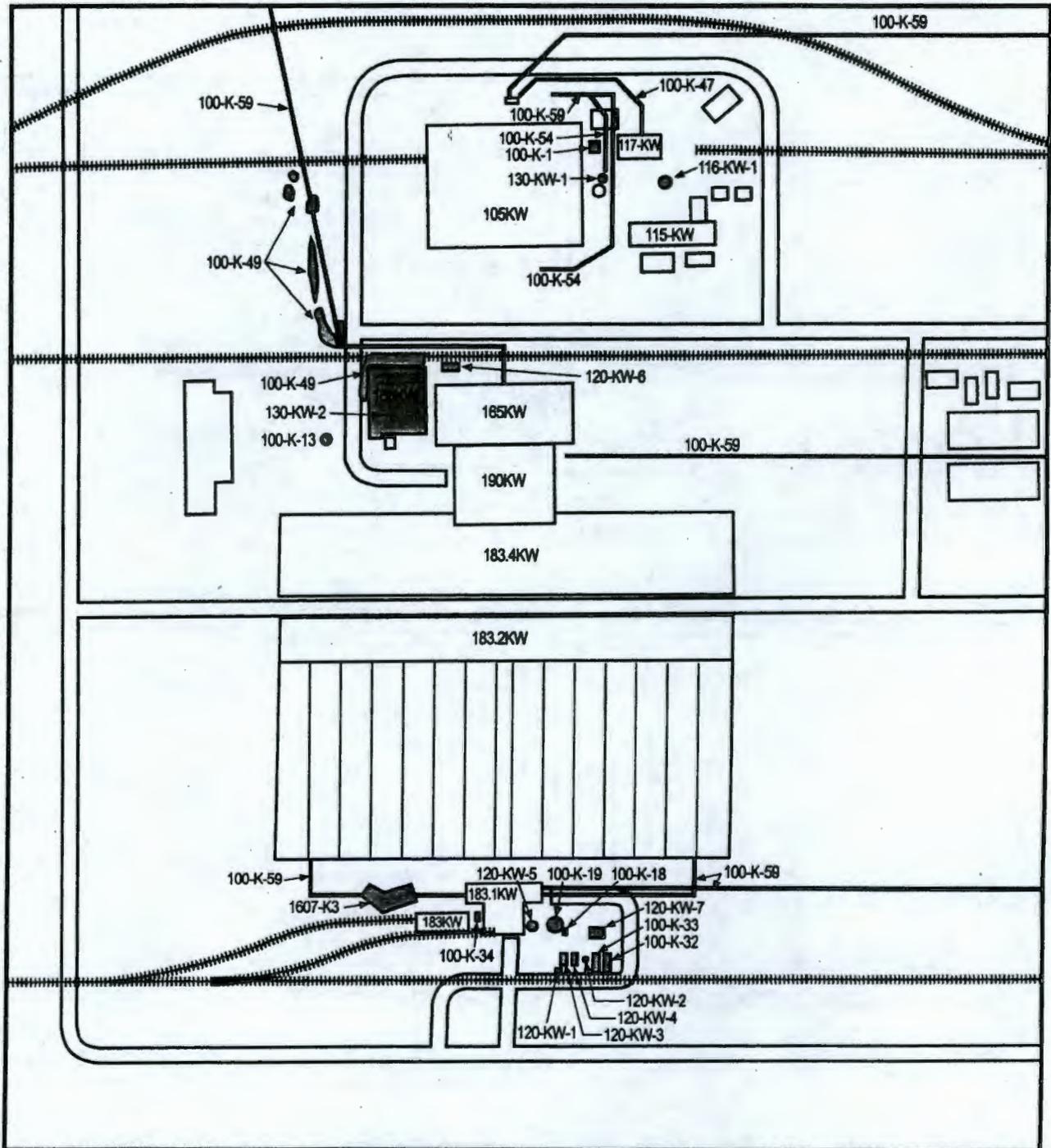


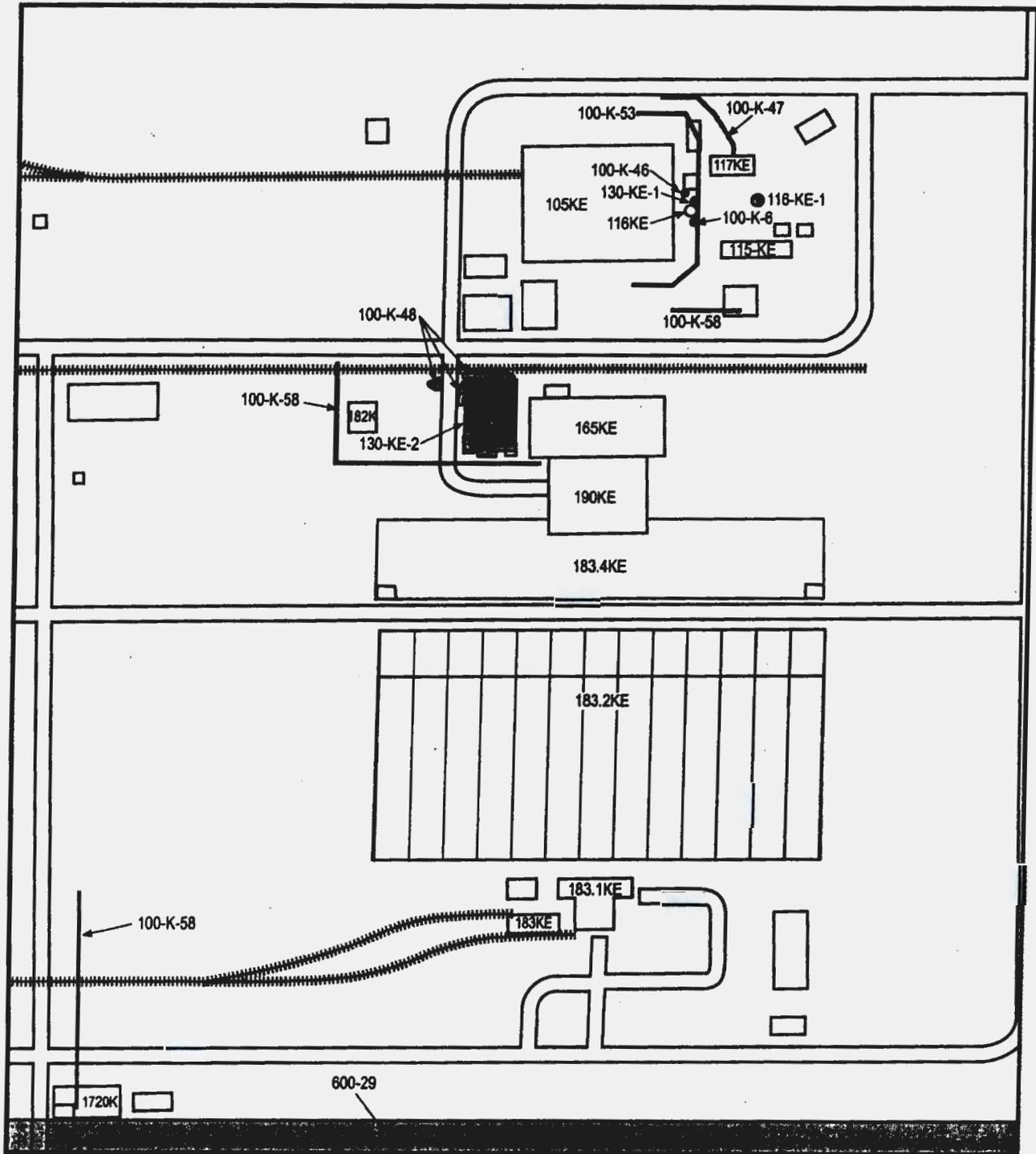
Figure 1. Map of the 100-K Area.

**Figure 2. Location of Potentially Impacted Waste Sites in the Western Portion of the 100-K Area.**

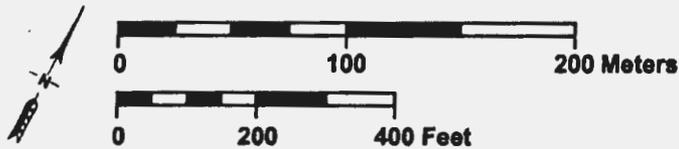


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**Figure 3. Location of Potentially Impacted Waste Sites in the Eastern Portion of the 100-K Area.**



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## 2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The 100-K Area ancillary facilities addressed in this action memorandum are contaminated with nonradiological hazardous substances used or generated during the plutonium production operations and with radiological contamination that could be spread through transport (e.g., birds, rodents) or as a result of facility deterioration. To help identify hazardous substances, several sources of information were used, including characterization data, historical operations, process knowledge, and knowledge of the construction materials.

The source of contamination at each facility within the 100-K Area ancillary facilities depended on the specific operations conducted at the facility. In general, contamination at the facilities resulted from activities associated with the operation of two single-pass, water-cooled reactors used to produce weapons-grade plutonium. The 100-K Area ancillary facilities provided treated water, backup power and steam, material storage and distribution, and maintenance support during construction, operation, and deactivation of the reactors. Radiological and hazardous material contamination is associated with these facilities.

To the extent practicable, hazardous substances (including bulk chemicals that are no longer in use) have been, or will be, removed from the facilities during routine surveillance and maintenance (S&M) operations.<sup>3</sup> However, residual contamination remains on facility surfaces (including the roof), in piping and ductwork, and in structural materials. The primary contaminants of concern include the following radionuclides:

- Americium-241
- Cesium-137
- Cobalt-60
- Strontium-90
- Tritium
- Plutonium.

At most of the facilities, the levels of individual isotopes are not currently known but will be determined, as needed, through data quality objective-directed sampling and analysis before disposal.

The facilities also contain nonradioactive hazardous substances as either contaminants from operations or components of building materials. These may include the following:

- Friable and nonfriable forms of asbestos
- Lead paint
- Lead shielding

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<sup>3</sup> Routine surveillance and maintenance includes periodic inspections, radiological and hazard monitoring, and basic facility maintenance to reduce the potential for contaminant release. In order for S&M waste to be considered a CERCLA waste it must be linked to the mitigation of a release, and thereby be eligible for disposal at the ERDF. *Routine waste* in general, is not CERCLA waste and therefore cannot be disposed of at the ERDF.

- Polychlorinated biphenyls (PCBs)
- Mercury (in switches, gauges, and thermometers)
- Refrigerants (freon)
- Petroleum products
- Water treatment products
- Lubricants
- Corrosives
- High-efficiency particulate air (HEPA) filter media
- Sodium-vapor and mercury-vapor lighting.

Appendix A contains a summary of the major contaminants and general levels of contamination for each of the facilities in the scope of this action (BHI 2004). Characterization will be conducted as part of the removal action activities in accordance with approved sampling and analysis plans. The characterization information will be used to support waste designation, which may include nondestructive assay, and to determine if the removal action objectives have been met. Characterization data will also be used to determine whether any contamination remaining after facility removal should be identified as a waste site to then be incorporated into the 100-KR-1 and 100-KR-2 OUs for subsequent remedial action.

#### **2.4 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT**

The ancillary facilities included in this removal action are known or suspected to be contaminated with radioactive and/or nonradioactive hazardous substances. In some facilities, the presence of hazardous substances is suspected but has not been confirmed. After further characterization, facilities determined as not contaminated with hazardous substances will be addressed outside of this action. The risks associated with the radioactive and/or nonradioactive contaminants have not been quantified in detail, in part because of limited characterization data. The following discussion provides a qualitative discussion of the risks.

The major contaminants of concern at the 100-K Area ancillary facilities are radionuclides, which above acceptable levels are known to be carcinogenic or hazardous. Many of the facilities may contain low levels of radiological contamination as surface contamination or as a part of the structural material. Where characterization data exist, potential exposure to workers and the public from radionuclide contamination that could be released from the facilities exceeds the upper end of the CERCLA risk range that can be approximated by a dose rate of 15 mrem/yr above background. For instance, a dose rate of 65 mrem/hr was measured near the 115-KW condensate drainlines. Hazardous substances, including asbestos insulation, heavy metals, and PCBs in building materials, are also present in the facilities. The four most commonly encountered hazardous substances in the facilities include asbestos, PCBs in fluids and paint, lead in building materials and paint, and elemental mercury found in switches, instrumentation, and drains.

A security fence currently surrounds the area to limit unauthorized entrance. In addition, the surplus facilities are locked and require approval prior to entry. As long as the DOE retains control of the 100-K Area, these access controls would help prevent direct contact with and exposure to the hazardous materials. However, access controls will not prevent deterioration of

the facilities or reduce the threat of release of radiological and hazardous substances to the environment over the long term. Radiological and hazardous substances could be released directly to the environment through a breach in a pipe, containment wall, roof, or other physical control as the facilities age and deteriorate. Radiological and hazardous substances could also be released to the environment through animal intrusion into the contaminated structures and systems. Historically, intrusion and spread of contamination by rodents, insects, birds, and other organisms has been difficult to control and prevent.

As the facilities continue to age and deteriorate, the threat of a release of radioactive and hazardous substances from facility deterioration and animal intrusion increases, and it becomes more difficult to confine these materials from the environment. The S&M activities required to confine the hazardous substances may increase the risk of potential exposure to personnel. Also, potential releases from associated waste sites pose a significant risk to human health and the environment.

## **2.5 OTHER ACTIONS TO DATE**

All of the facilities are either deactivated or partially deactivated. Facility deactivation involves removal of loose physical, chemical, or radiological hazards. The facilities are currently undergoing S&M.

## **3.0 THREATS TO HUMAN HEALTH OR THE ENVIRONMENT**

Conditions persist wherein threats to the public health or the environment exist.

The "National Oil and Hazardous Substance Pollution Prevention Contingency Plan" (NCP), 40 *Code of Federal Regulations* (CFR) 300.415(b)(2), establishes factors to be considered in determining the appropriateness of a removal action. Those factors include the following:

- *Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.* Hazardous substances, including radionuclides, are present within the equipment and structures. These substances pose an increasing threat of release to humans and ecological receptors as the facilities continue to deteriorate with age. As contamination becomes exposed and as structural integrity is compromised, the potential direct exposure (i.e., inhalation of contaminated dust and debris, direct contact with contaminated debris) of nearby personnel and the environment, and exposure to the public through airborne radioactive contaminants increases.
- *Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.* The potential for wind or precipitation-related releases of hazardous substances within the facilities increases as the facilities continue to deteriorate with age.
- *Hazardous substances or pollutants or contamination in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release.* Hazardous substances, including radioactive substances, are contained within the pipes and vessels of the 27 facilities

addressed in this action memorandum. These substances pose a threat of accidental release that may result from animal intrusion, deterioration, or severe weather conditions.

The external radiation, inhalation, and ingestion risks to the site workers, the public, and ecological receptors associated with potential releases of contamination justify a non-time-critical removal action.

#### **4.0 ENDANGERMENT DETERMINATION**

The response action proposed is necessary to protect the public health or welfare or the environment from the actual or threatened releases of hazardous substances, including radioactive substances from the facilities into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health or welfare or the environment.

#### **5.0 PROPOSED ACTIONS AND ESTIMATED COSTS**

Proposed actions and estimated costs are presented in the following sections.

##### **5.1 PROPOSED ACTION**

An EE/CA was prepared to develop removal action alternatives for 27 of the 100-K Area ancillary facilities (DOE-RL 2004). The scope of this removal action addresses only the facilities themselves. The soil underlying some of the facilities may also be contaminated. Where there is previous knowledge of such contamination, the soil has already been identified as a separate waste site and will be remediated under the authority of CERCLA remedial actions under the 100-KR-1 and 100-KR-2 OU RODs. If extensive contamination associated with the underlying soil is identified in the future, it will be noted within the Waste Information Data System (WIDS) and addressed under the 100-KR-1/100-KR-2 OU remediation process or other soil remediation activity. Orphan or otherwise unidentified facilities and foundations within the geographical boundary (see Figure 1) of this removal action that are not addressed by the 100-KR-1 and 100-KR-2 OUs may be addressed as part of this action upon EPA approval if the facility is found to be contaminated with hazardous substances and poses a threat of release to the environment that is similar to the 27 facilities.

The removal action alternatives evaluated for the 100-K Area ancillary facilities must meet the removal action objectives. Specific removal action objectives identified for this removal action include the following:

- Protect human receptors from exposure to radiological and hazardous substances from facilities above acceptable exposure levels for employees
- Control the release of radiological and hazardous substances from the facilities into the environment
- Facilitate remediation of 100-K Area waste sites and, to the extent practicable, be consistent with anticipated remedial actions within the 100-K Area OUs
- Achieve applicable or relevant and appropriate requirements (ARARs) to the fullest extent practicable
- Safely treat, as appropriate, and dispose of waste streams generated by the removal action.

Based on these considerations, the following three removal action alternatives were identified:

- Alternative one: No action
- Alternative two: Deactivation/decontamination and decommissioning (D&D)
- Alternative three: S&M with eventual deactivation/D&D.

#### **5.1.1 Alternative One: No Action**

Under the no action alternative, Hanford Site access controls would be maintained to help prevent worker or public entry to the contaminated facilities. This would basically include locking the facilities and existing gates. No other specific controls would be established for the facilities. Risks over time are expected to increase as facility deterioration progresses and structural integrity is compromised. The no action alternative does not address the hazards posed by the facilities, which will increase as the facilities continue to deteriorate. Eventually, decay is expected to result in radiological releases to the environment and potential exposure to personnel and the public. Physical hazards associated with partial structure collapse also are anticipated.

In addition, the no action alternative would impede remedial action progress for the 100-KR-1/100-KR-2 OU waste sites located in the geographical area by inhibiting access to the waste sites.

#### **5.1.2 Alternative Two: Deactivation/D&D**

The objective of the D&D alternative is to demolish the buildings and structures and reduce the threat of release of hazardous substances. The action includes deactivating the facilities by removing physical, chemical, and radiological barriers to demolition. Deactivation would be followed by decontamination, decommissioning, and demolition of the buildings and structures,<sup>4</sup>

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<sup>4</sup> This includes building contents, above-ground structures, on-grade floor slabs, and the below-grade foundations and piping.

and disposal of the materials at the ERDF or other approved facility in accordance with waste acceptance criteria. The D&D alternative would initiate the process of demolishing the 27 buildings and structures in the 100-K Area in the near future. In some facilities, the presence of hazardous substances is suspected but has not been confirmed. After further characterization, facilities determined as not contaminated with hazardous substances will be addressed outside of this action. The D&D alternative is estimated to take 8 years to implement.

The majority of the facility demolition would require the use of heavy equipment (e.g., excavator with various attachments) to demolish structures. Other industry standard practices for demolition also might be used (e.g., mechanical saws and cutting torches). In general, below-grade structures (e.g., slab, basement, and foundation) would be demolished and removed. Approximately 1 m of surrounding soil will be removed and disposed with the building material. On a case-by-case basis, the facility slab or foundation may be left in place to be addressed as necessary by remedial action where the facilities are located above or adjacent to known or suspected 100-KR-1 and 100-KR-2 OU waste sites. In these instances, clean fill/soil or other barrier may be placed over remaining contamination as a temporary measure in accordance with an EPA-approved work plan.

### **5.1.3 Alternative Three: S&M (with Eventual Deactivation/D&D)**

The objective of long-term S&M is to sustain the buildings and structures in a safe condition for 26 years<sup>5</sup> before initiating the demolition process. To the extent possible, S&M would be performed to minimize the potential for an environmental release and to protect workers while maintaining compliance with applicable state and federal regulations and DOE orders. Activities would be balanced to reduce worker hazards and the potential for contaminant release. Major repairs such as re-roofing and shoring structural components would be performed, as necessary, to ensure facility integrity for containment of hazardous substances within the structure. Institutional controls would be maintained to warn workers of potential hazards and restrict public access to the facilities. After 26 years, the activities described in the D&D alternative (alternative two) would be initiated and completed. The duration of D&D is estimated to be 8 years.

In general, as facilities age and deteriorate, S&M must become more aggressive over time, and worker safety is a critical factor. Without an increasingly aggressive S&M program, the threats associated with unplanned releases to the environment and injury or exposure to workers would increase. Conversely, an aggressive S&M program would require more frequent worker entry into the facilities to perform more invasive maintenance procedures, which would increase the potential for exposure to workers. In addition, personal protection requirements to maintain a more aggressive program could continually increase, which would add to the cost.

Following the S&M phase of this alternative, the facilities would still need to undergo deactivation and D&D. The deactivation and D&D phase of the alternative is assumed to be performed as described in Section 5.1.2.

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<sup>5</sup> The 26-year long-term S&M period was selected to represent an extended delay of D&D activities. The actual date does not coincide with any current target dates or milestones.

## 5.2 WASTE MANAGEMENT CONSIDERATIONS FOR ALTERNATIVES

With the exception of the no action alternative, each of the alternatives results in the generation of waste requiring appropriate disposal. The majority of the contaminated debris likely will designate as low-level waste (LLW); however, quantities of mixed waste, dangerous waste, and transuranic (TRU) waste might be generated. Waste management ARARs are discussed in Section 5.3. Waste will be managed in accordance with an EPA-approved waste management plan.

Contaminated waste for which no reuse, recycle, or decontamination option is identified would be characterized and assigned an appropriate waste designation (e.g., solid, asbestos, PCB, radioactive, dangerous, mixed). Most of the contaminated waste generated during implementation of these alternatives would be disposed at the Hanford Site at the ERDF near the 200 West Area. The ERDF is the preferred waste disposal option because the ERDF is an engineered facility that provides a high degree of protection to human health and the environment, and previous EE/CAs for other Hanford Site facilities have shown that this disposal option is more cost effective than disposal at other disposal sites. Construction of the ERDF was authorized using a separate CERCLA ROD (EPA 1995). The ERDF is designed to meet minimum *Resource Conservation and Recovery Act of 1976* (RCRA) technological requirements for landfills, including standards for double liner, a leachate collection system, leak detection, monitoring, and a final cover.

In 1996, an Explanation of Significant Difference (ESD) (Ecology et al. 1996) clarified the ERDF ROD (EPA 1995) for eligibility of waste generated during Hanford Site cleanup activities. In accordance with the ESD, any LLW, mixed waste, or hazardous/dangerous waste generated as a result of CERCLA or RCRA cleanup actions (e.g., D&D, RCRA past-practice, and investigation-derived wastes) is eligible for ERDF disposal, provided that appropriate CERCLA decision documents are in place and that the waste meets *Environmental Restoration Disposal Facility Waste Acceptance Criteria* (BHI 2002). The waste that would be generated under these alternative CERCLA removal actions falls within the definition of waste eligible for disposal at the ERDF.

While most waste generated during the removal action is anticipated to meet ERDF waste acceptance criteria, some waste may require treatment to meet ERDF waste acceptance criteria and/or RCRA land disposal restrictions. The type of treatment and the location of treatment would be conducted in accordance with the approved work plan. In most cases, the type of treatment anticipated would typically consist of immobilization techniques such as macroencapsulation for debris waste or grouting for nondebris waste.

Liquid waste containing levels of radioactive and/or nonradioactive hazardous substances meeting the 200 Area Effluent Treatment Facility (ETF) waste acceptance criteria would be transferred to the ETF and treated to meet ETF waste discharge criteria. Liquids that do not meet ETF waste acceptance criteria would be treated to meet land disposal restrictions and either disposed at the ERDF (if ERDF waste acceptance criteria are met) or stored at the Central Waste Complex (CWC) or another approved storage facility, subject to final disposition under CERCLA. Uncontaminated water (e.g., nonradioactive and nonhazardous) could be used for dust suppression.

If TRU waste is encountered, it would be placed in interim storage at the Waste Receiving and Processing Facility, Module 1 (WRAP) or the CWC and shipped offsite to the Waste Isolation Pilot Plan (WIPP) in accordance with the WIPP waste acceptance criteria.

Of the above Hanford Site disposal options, only the ERDF is considered to be "onsite" for management and/or disposal of waste from removal actions proposed in this document.<sup>6</sup> There is no requirement to obtain a permit to manage or dispose of CERCLA waste at the ERDF. It is expected that the great majority of the waste generated during the removal action proposed in this document can be disposed onsite at the ERDF. For waste that must be sent offsite, the EPA would make a determination in accordance with 40 CFR 300.440 as to the acceptability of the proposed site for receiving this CERCLA removal action waste.

### **5.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND OTHER CRITERIA, ADVISORIES, OR GUIDANCE TO BE CONSIDERED**

40 CFR 300.415(j) requires ARARs be met (or waived) to the extent practicable during the course of removal actions. When requirements are identified, a determination must be made as to whether those requirements are applicable or relevant and appropriate. A requirement is applicable if it specifically addresses a hazardous substance, pollutant or contaminant, remedial action, location or other circumstance at the site. If not applicable, a requirement may nevertheless be relevant and appropriate if it addresses problems or situations sufficiently similar to the problems or situations encountered and their use is well suited to the site.

ARARs include only substantive requirements of environmental standards. ARARs do not include administrative requirements, including requirements to obtain any federal, state, or local permits (40 CFR 300.400[e] and 42 U.S.C. 9621[e]).

To-be-considered (TBC) information consists of advisories or guidance issued by federal or state governments that are not binding legally and do not have the status of ARARs. As appropriate, TBC information should be considered in determining the removal action necessary for protection of human health and the environment. Requirements drawn from TBC information may be included in the selected alternative.

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<sup>6</sup> CERCLA Section 104(d)(4) states that, 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 for the purpose of this section. The preamble of the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300) 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 site for response purposes and, therefore, allows the lead agency to manage waste transferred between such noncontiguous facilities without having to obtain a permit. Therefore, the 100 Area National Priorities List site and the ERDF are considered to be onsite for response purposes under this removal action. It should be noted that the scope of work covered in this removal action is for facilities and waste contaminated with hazardous substances. The DOE will disposition materials encountered during implementation of the selected removal action that are not contaminated with hazardous substances under non-CERCLA authority.

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 releases to the environment, standards for protection of natural resources, and safety and health standards.<sup>7</sup> These standards are discussed generally in the following sections. Offsite management would require compliance with all applicable, substantive, and administrative requirements.

### 5.3.1 Waste Management Standards

A variety of waste streams would be generated under the proposed removal action alternatives. It is anticipated that most of the waste will designate as LLW. However, quantities of TRU waste, dangerous or mixed waste, and asbestos and asbestos-containing material could also be generated. The great majority of the waste will be in a solid form. However, some liquid solutions may be generated.

Waste designated as LLW that meets ERDF waste acceptance criteria (BHI 2002) would be disposed at the ERDF, which is engineered to meet appropriate performance standards under 10 CFR 61. If TRU waste is encountered, it would be placed in interim storage at WRAP or the CWC and shipped offsite to WIPP in accordance with the WIPP waste acceptance and the schedule established for completing 100-K interim response actions no later than December 31, 2012.

The identification, storage, treatment, and disposal of the hazardous waste component of mixed waste generated during the removal action would be subject to the substantive provisions of RCRA. In Washington State, RCRA is implemented through *Washington Administrative Code* (WAC) 173-303, which is an EPA-authorized state program to implement most elements of the RCRA program. The substantive portions of the dangerous waste standards for generation, treatment, disposal, and storage are applicable to the management of any dangerous or mixed waste generated under this action. Treatment standards for dangerous or mixed waste subject to RCRA land disposal restrictions are specified in WAC 173-303-140, which incorporates 40 CFR 268 by reference. Waste that does not qualify for disposal in ERDF will be disposed of at an offsite facility approved by EPA in accordance with 40 CFR 300.440.

Waste designated as dangerous or mixed waste would be treated as appropriate to meet land disposal restrictions and ERDF acceptance criteria and disposed at the ERDF. The ERDF is engineered to meet landfill design standards under WAC 173-303-665. All applicable packaging and pre-transportation requirements for dangerous or mixed waste generated at the 27 facilities would be identified and implemented before movement of any waste.

Some of the aqueous waste designated as LLW, dangerous, or mixed waste may be transported to the ETF for treatment and disposal. The ETF is a RCRA-permitted facility authorized to treat

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<sup>7</sup> Safety standards are not environmental standards per se and therefore are not potential ARARs. Instead, compliance with applicable safety regulations, such as Occupational Safety and Health Administration requirements, is required external to the CERCLA ARAR process. However, because of the nature and importance of these standards, a discussion of the safety requirements is included in this action memorandum.

aqueous waste streams generated on the Hanford Site and dispose of these streams at a designated state-approved land disposal facility in accordance with all applicable requirements.

The management and disposal of PCB waste are subject to the *Toxic Substances Control Act of 1976* (TSCA) and regulations at 40 CFR 761. The TSCA regulations contain specific provisions for PCB waste, including PCB waste that contains a radioactive component. PCBs are also considered underlying hazardous constituents under RCRA and thus could be subject to WAC 173-303 and 40 CFR 268 requirements for wastes that also designate as hazardous or mixed wastes. Offsite treatment and/or disposal would require an offsite acceptability determination from the EPA in accordance with 40 CFR 300.440, with notification to Ecology. Waste designated as PCB remediation waste would likely be disposed at the ERDF, depending on whether the waste is a LLW. All waste suspected to contain PCBs would be evaluated to determine whether the waste meets ERDF acceptance criteria. Any PCB waste that does not meet ERDF acceptance criteria would be retained at a PCB storage area meeting the requirements for TSCA storage and transported for future disposal at an appropriate disposal facility.

Removal and disposal of asbestos and asbestos-containing material are regulated under the *Clean Air Act of 1977* (40 CFR 61, Subpart M). The 40 CFR 61 requirements applicable to this removal action are contained in 40 CFR 61.145(c) and 40 CFR 61.150. These regulations establish removal requirements based on quantity present and handling requirements. These regulations also specify handling, packaging, and disposal requirements for regulated sources having the potential to emit asbestos. Substantive requirements of these standards are applicable because this removal action includes abatement of asbestos and asbestos-containing materials. Asbestos and asbestos-containing material would be removed, packaged as appropriate, and disposed at ERDF.

The *Hazardous Materials Transportation Act of 1974*, as implemented by the "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials" (49 CFR 100 through 179), governs the transportation of potentially hazardous materials, including samples and waste. These requirements are not potential ARARs but would have to be met where applicable for any wastes or contaminated samples that would be shipped from the 100-K Area in commerce and over public roads.

The removal action will be performed in compliance with all of the above waste management ARARs. All waste streams will be evaluated, designated, and managed in compliance with the ARAR requirements. Before disposal, waste will be managed in a protective manner to prevent releases to the environment or unnecessary exposure to personnel. Details on how compliance with ARARs will be achieved during implementation of the removal action will be contained in the removal action work plan.

### **5.3.2 Standards Controlling Emissions to the Environment**

The proposed removal action alternatives would have the potential to generate both radioactive and nonradioactive airborne emissions.

The federal *Clean Air Act* and the "Washington Clean Air Act" (*Revised Code of Washington 70.94*) regulate both criteria/toxic and radioactive airborne emissions. Implementing regulations found in 40 CFR 61.92 set limits for emission of radionuclides from the entire facility to ambient air. Radionuclide emissions cannot exceed those amounts that would cause any member of the public to receive an effective dose equivalent of 10 mrem/yr. The definition of a facility includes all buildings, structures, and operations at one contiguous site. This requirement is applicable because there is the potential to emit radionuclides to unrestricted areas from the removal action. The substantive provisions of WAC 173-480-070, which require verification of compliance with this standard, would be applicable to the removal action.

Radioactive air emissions are to be controlled through the use of best available radionuclide control technology (WAC 246-247-040[3]) or as low as reasonably achievable control technology (WAC 246-247-040[4]). Emissions of radionuclides are to be measured for point sources (40 CFR 61.93) and for nonpoint sources (WAC 246-247-075[8]). Measurement techniques may include, but are not limited to, sampling, calculation, or smears for identifying emissions as determined by the lead regulatory agency. The substantive requirements of these regulations are applicable because fugitive, diffuse, and point source emissions of radionuclides to the ambient air may result from activities performed during the removal action.

WAC 173-400 and WAC 173-460 establish requirements for emissions of criteria/toxic air pollutants. The primary source of emissions resulting from this removal action would be fugitive particulate matter. Requirements applicable to this removal action are contained in WAC 173-400-040(3) and (8). These regulations require that reasonable precautions be taken to (1) prevent the release of air contaminants associated with fugitive emissions resulting from materials handling, demolition, or other operations; and (2) prevent fugitive dust from becoming airborne from fugitive sources of emissions.

WAC 173-460 would be applicable to removal actions that require the use of a treatment technology that emits toxic air pollutants. No treatment requirements have been identified at this time that would be required to meet the substantive applicable requirements of WAC 173-460. Treatment of some waste encountered during the removal action may be required to meet the ERDF waste acceptance criteria. In most cases, the type of treatment anticipated would consist of immobilization techniques such as macroencapsulation or grouting, and WAC 173-460 would not be considered an ARAR because it would not result in emissions of toxic air pollutants. If more aggressive onsite treatment is required that would result in the emission of toxic air pollutants, the substantive requirements of WAC 173-460-030, WAC 173-460-060, and WAC 173-460-070 would be met if the requirements are applicable or relevant and appropriate.

### **5.3.3 Standards for Protection of Cultural and Natural Resources**

The *Archeological and Historic Preservation Act of 1974* provides for the preservation of historical and archeological data (including artifacts) that might be irreparably lost or destroyed

as the result of a proposed action. Although the removal action will occur in previously disturbed areas and the discovery of artifacts is unlikely, this law would be applicable to any significant artifacts that may be discovered.

The *Native American Graves Protection and Repatriation Act of 1990* (as implemented by 43 CFR 10) requires agencies to consult and notify culturally affiliated tribes when Native American human remains are inadvertently discovered during project activities. It is unlikely that work proposed in this removal action would inadvertently uncover human remains. If human remains were encountered, the procedures documented in the *Hanford Cultural Resources Management Plan* (DOE-RL 2003) would be followed.

The *National Historic Preservation Act of 1966* (as implemented by 36 CFR 800) requires federal agencies to evaluate historic properties for National Historic Register eligibility and to mitigate adverse effects of federal activities on any site eligible for listing in the Register. Five of the facilities in the scope of this removal action are eligible for listing in the Register. Prior to initiating a project on the Hanford Site, a cultural resource review is required to ensure that impacts are assessed and methods to avoid, minimize, or mitigate adverse effects are developed and implemented. All facilities included in the scope of this removal action will be inspected to identify artifacts that may have interpretive or educational value prior to deactivation, decontamination, or decommissioning activities and methods developed and implemented as necessary to avoid, minimize, or mitigate adverse effects.

The *Endangered Species Act of 1973* and WAC 232-012-297 require the conservation of critical habitat on which endangered or threatened species depend and prohibit activities that threaten the continued existence of listed species or destruction of critical habitat. The *Migratory Bird Treaty Act of 1918* makes it illegal to remove, capture, or kill any migratory bird or any part of nests or the eggs of any such birds. Although adverse impacts to endangered or threatened species or migratory birds are not expected, activity specific ecological reviews will be conducted to identify any potentially adverse impacts prior to beginning field work and actions taken as necessary to comply.

#### **5.3.4 Safety and Health Standards**

Although worker safety requirements are not potential ARARs under CERCLA, they must be followed in accordance with DOE requirements during the course of the removal action. The DOE is the authority for radiation protection standards, limits, and program requirements for protecting workers from ionizing radiation as specified in "Occupational Radiation Protection" (10 CFR 835). The rule also requires that measures be taken to maintain radiation exposures as low as reasonably achievable. In addition, the DOE has existing internal requirements that impose following Occupational Safety and Health Administration requirements for worker protection (e.g., 29 CFR 1910 and 29 CFR 1926), national consensus standards, and DOE orders. Exposure limits, personnel protection requirements, and decontamination methods for hazardous chemicals are established by 29 CFR 1910. Identification and mitigation of physical hazards posed by a facility including (but not limited to) confined spaces, falling hazards, fire, and electrical shock are also required. 29 CFR 1926 provides requirements for worker safety during construction activities. The applicable DOE orders require analysis of hazards posed by work activities and identification of controls necessary to work safely.

Under alternative two or three of the EE/CA, radiological and physical hazards would be identified and analyzed prior to the start of field activities, and appropriate measures for mitigation would be addressed in a task-specific health and safety plan. A combination of personal protective equipment, personnel training, and administrative controls (e.g., limiting time in and distance from radiation zones) would be used to ensure that the requirements for worker protection are met. Individual monitoring would be performed as necessary to verify compliance with the requirements.

#### **5.4 ESTIMATED COSTS**

The following is a summary of estimated costs for alternatives two and three considered in the EE/CA. The near-term costs for implementing alternative one, the no action alternative, are negligible. The facilities will be locked and gates, where they exist, will be secured. No costs are expected once this has been accomplished. Costs for the no action alternative were not estimated.

Consistent with guidance established by the EPA and the U.S. Office of Management and Budget (OMB), present-worth analysis is included as a basis for comparing costs of cleanup alternatives under the CERCLA program (EPA 1993). For the purposes of this evaluation, present-worth (discounted) cost values were calculated using the real interest rate on treasury notes and bonds from OMB Circular A-94, Appendix C (OMB 1992).

Current-year (nondiscounted) and present-worth (discounted) cost estimates for the two alternatives are shown in Table 2. The current-year (nondiscounted) cost for implementing deactivation/D&D (Alternative 2) for the facilities included in the scope of this action memorandum would be approximately \$27.7 million based on present-day (2004) dollars. The nondiscounted cost is the total cost without any adjustment based on an assumed interest rate over the duration of the project. The present-worth (discounted) cost is approximately \$25.5 million and is assumed to increase in value at a rate of 2.4% over the assumed 8-year duration of deactivation/D&D.

The current-year (nondiscounted) cost of implementing S&M followed by deactivation/D&D (Alternative 3) for the facilities included in the scope of this action memorandum would be \$36.8 million based on present-day (2004) dollars. The present-worth (discounted) cost is \$16.2 million and is assumed to increase in value at a rate of 3.5% over the assumed 26-year duration of S&M.

**Table 2. Cost Comparison for Removal Action Alternatives  
for the 100-K Area Ancillary Facilities.<sup>a</sup>**

Alternative	Current-Year Cost <sup>a</sup>	Present-Worth Cost
Alternative one: No action	No cost	No cost
Alternative two: Deactivation/D&D	\$27,700,000	\$25,530,000 <sup>c</sup>
Alternative three: Long-term S&M	\$36,800,000	\$16,190,000 <sup>d</sup>

<sup>a</sup> All costs are 2004 dollars based on estimates prepared for the *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities* (DOE-RL 2004).

<sup>b</sup> The current-year (nondiscounted) cost is the total cost without any adjustment based on an assumed interest rate over the duration of the project.

<sup>c</sup> The present-worth discounted cost is assumed to increase in value at a rate of 2.4% over the assumed 8-year duration of the project. The discount rate used is the 7-year value of 2.4% from OMB Circular A-94, Appendix C (OMB 1992). This rate was published in 2004 and is valid through January 2005.

<sup>d</sup> The present-worth discounted cost is assumed to increase in value at a rate of 3.5% over the assumed 26-year duration of the project. The discount rate used is the 30-year value of 3.5% from OMB Circular A-94, Appendix C (OMB 1992). This rate was published in 2004 and is valid through January 2005.

D&D = decontamination and decommissioning

S&M = surveillance and maintenance

## 5.5 PROJECT SCHEDULE

The 100-K Area ancillary facilities removal action is scheduled to begin in June 2005. The 100-K Area ancillary facilities sampling and analysis plan, waste management plan, and removal action work plan (including the air monitoring plan) will be submitted to the EPA for review and approval during project preparatory activities. These plans will be implemented as written and approved.

Completion of the 100-K interim response actions of this removal action is currently scheduled for no later than December 31, 2012.

## 6.0 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Severe weather can create facility conditions amenable to radiological releases, and long-term aging of engineered controls can lead to eventual failure. Additionally, failure to remove certain facilities precludes cost-effective remediation of underlying or adjacent waste sites. These conditions could result in an unplanned release. This may cause a threat to human health and the environment by direct exposure to nearby personnel and the environment and exposure to the public through airborne radioactive contaminants.

## 7.0 OUTSTANDING POLICY ISSUES

There are no outstanding policy issues for this removal action.

## 8.0 SELECTED ALTERNATIVE

The selected removal action alternative for the facilities included in this action memorandum is deactivation and D&D (Alternative 2). The deactivation/D&D alternative provides increased protection to human health and the environment and is effective in maintaining that protection in both the short term and the long term. The alternative removes the threat of release of radiological and hazardous substances to the environment, which is caused by facility deterioration or animal intrusion, and reduces potential exposure to personnel caused by continued S&M of aging facilities. In addition, removal of the associated buildings contributes to the efficient performance of long-term remedial actions for the 100-KR-1 and 100-KR-2 OUs.

This removal alternative was developed in accordance with CERCLA, as amended by the *Superfund Amendments and Reauthorization Act*, and is consistent with the NCP. This decision is based on the information provided in the Administrative Record for this project.

## 9.0 REFERENCES

- 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *Code of Federal Regulations*, as amended.
- 10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, as amended.
- 29 CFR 1910, "Occupational Safety and Health Standards," *Code of Federal Regulations*, as amended.
- 29 CFR 1926, "Safety and Health Regulations for Construction," *Code of Federal Regulations*, as amended.
- 36 CFR 800, "Protection of Historic Properties," *Code of Federal Regulations*, as amended.
- 40 CFR 61, "National Emissions Standards for Hazardous Air Pollutants," *Code of Federal Regulations*, as amended.
- 40 CFR 268, "Land Disposal Restrictions," *Code of Federal Regulations*, as amended.
- 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, as amended.

40 CFR 761, "Polychlorinated Biphenyls (PCBs)," *Code of Federal Regulations*, as amended.

43 CFR 10, "Native American Graves Protection and Repatriation Regulations," *Code of Federal Regulations*, as amended.

49 CFR 100-179, "Transportation," *Code of Federal Regulations*, as amended.

65 FR 37253, "Establishment of the Hanford Reach National Monument," *Federal Register*, Vol. 65, p. 37253, June 9, 2000.

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*Clean Air Act of 1977*, 42 U.S.C. 7401, et seq.

*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, 42 U.S.C. 9601, et seq.

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DOE-RL, 2003, *Hanford Cultural Resources Management Plan*, DOE/RL-98-10, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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Ecology, EPA, and DOE, 1996, *U.S. Department of Energy Environmental Restoration Facility, Hanford Site, Benton County, Washington, Explanation of Significant Difference*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

*Endangered Species Act of 1973*, 16 U.S.C. 1531, et seq.

EPA, 1993, *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA*, EPA/540/F-94/009, U. S. Environmental Protection Agency, Washington D.C.

EPA, 1995, *Record of Decision for the Environmental Restoration Disposal Facility*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA, 1999, *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

*Hazardous Materials Transportation Act of 1974*, 49 U.S.C. 1801-1813, et seq.

*Migratory Bird Treaty Act of 1918*, 16 U.S.C. 703, et seq.

*National Historic Preservation Act of 1966*, 16 U.S.C. 470, et seq.

*Native American Graves Protection and Repatriation Act of 1990*, 25 U.S.C. 3001, et seq.

OMB, 1992, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, Circular No. A-94, Office of Management and Budget, Washington, D.C.

RCW 70.94, "Washington Clean Air Act," *Revised Code of Washington* 70.94, as amended.

*Resource Conservation and Recovery Act of 1976*, 42 U.S.C. 6901, et seq.

*Superfund Amendments and Reauthorization Act of 1986*, 42 U.S.C. 9601, et seq.

*Toxic Substances Control Act of 1976*, 15 U.S.C. 2601, et seq.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, as amended.

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, as amended.

WAC 173-480, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, as amended.

WAC 232-012-297, "Endangered, Threatened, and Sensitive Wildlife Species Classification," *Washington Administrative Code*, as amended.

WAC 246-247, "Radiation Protection -- Air Emissions," *Washington Administrative Code*, as amended.

**Signature sheet for the Action Memorandum for the Removal Action at the 100-K Area  
Ancillary Facilities between the U.S. Environmental Protection Agency and the U.S. Department  
of Energy**



**Leif Erickson, Assistant Manager  
for the River Corridor  
Richland Operations Office  
U.S. Department of Energy**

6/7/05

**Date**

Signature sheet for the Action Memorandum for the Removal Action at the 100-K Area  
Ancillary Facilities between the U.S. Environmental Protection Agency and the U.S. Department  
of Energy



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Nick Ceto, Hanford Project Manager  
U.S. Environmental Protection Agency

7 June 2005

Date

**APPENDIX A**

**SUMMARY OF FACILITIES IN THE SCOPE OF ACTION MEMORANDUM FOR  
THE 100-K AREA ANCILLARY FACILITIES**

**Table A-1. Summary of Facilities in the Scope of Action Memorandum for the 100-K Area Ancillary Facilities. (4 Pages)**

#	Facility	Name	Facilities <sup>a, b, c, d</sup>	Nature of Contamination		Associated Hazard
				Radioactive	Nonradioactive	
1	110-KW	Gas Storage	Small	Potentially contaminated with mixed fission and activation products	Lead	Interferes with access to waste site 116-KW-1
2	115-KW	Gas Recirculation Building	Major	Contaminated with mixed fission and activation products 65 mR/hr on condensate drainlines	Lead, mercury, asbestos	Interferes with access to waste site 116-KW-1
3	116-KW	Reactor Stack	Small/historic	Contaminated with mixed fission products and plutonium	None	Interferes with access to waste sites 130-KW-1, 100-K-1, 100-K-54, 100-K-59
4	117-KW	Exhaust Air Filter Building	Major/historic	Contaminated with mixed fission products and plutonium 5 mR/hr on filters in B Cell	Asbestos	Interferes with access to waste sites 130-KW-1, 100-K-47
5	118-KW-2	Horizontal Control Rod Storage Cave	Small	Potentially contaminated with mixed fission and activation products	None	
6	119-KW	Exhaust Air Sampling Building	Small/historic	Potentially radiologically contaminated	Lead, mercury, asbestos	Interferes with access to waste site 100-K-1
7	166-KW	Oil Storage Vault	Major	Potentially radiologically contaminated	Organic materials, solvents, fuel oil	Interferes with access to waste sites 130-KW-2, 100-K-13, 120-KW-6, 100-K-59, 100-K-49
8	183-KW	Chlorine Car Protection Building	Small	Potentially radiologically contaminated	Lead, mercury, asbestos	Interferes with access to waste sites 100-K-34, 1607-K3

**Table A-1. Summary of Facilities in the Scope of Action Memorandum for the 100-K Area Ancillary Facilities. (4 Pages)**

#	Facility	Name	Facilities <sup>a, b, c, d</sup>	Nature of Contamination		Associated Hazard
				Radioactive	Nonradioactive	
9	183.1-KW	Headhouse	Major/historic	Potentially radiologically contaminated	Lead, mercury, asbestos	Interferes with access to waste sites 120-KW-2, 120-KW-3, 120-KW-4, 120-KW-5, 120-KW-7, 100-K-18, 100-K-19, 100-K-32, 100-K-33, 100-K-34, 100-K-59
10	183.2-KW	Sedimentation Basins	Major	Potentially radiologically contaminated	Lead	
11	183.3-KW	Filter Basin	Major	Potentially radiologically contaminated	Lead	
12	183.4-KW	Reservoir and Clearwells	Major	Potentially radiologically contaminated	Lead	
13	183.5-KW	Lime Feeder Building	Small	Potentially radiologically contaminated	Lead, mercury, asbestos	
14	183.6-KW	Lime Feeder Building	Small	Potentially radiologically contaminated	Lead, mercury, asbestos	
15	183.7-KW	Pipe Tunnel	Major	Potentially radiologically contaminated	Lead, mercury, asbestos	
16	190-KW	Process Water Pumphouse	Major/historic	Potentially radiologically contaminated	Lead, mercury, asbestos, ethylene glycol	Interferes with access to waste site 100-K-59
17	110-KE	Gas Storage	Small	Potentially contaminated with mixed fission and activation products	Lead	Interferes with access to waste site 116-KE-1

**Table A-1. Summary of Facilities in the Scope of Action Memorandum for the 100-K Area Ancillary Facilities. (4 Pages)**

#	Facility	Name	Facilities <sup>a, b, c, d</sup>	Nature of Contamination		Associated Hazard
				Radioactive	Nonradioactive	
18	115-KE	Gas Recirculation Building	Major	Contaminated with mixed fission and activation products 30 mR/hr on condensers	Lead, mercury, asbestos	Interferes with access to waste sites 116-KE-1, 100-K-6, 130-KE-1, 100-K-46, 100-K-53, 100-K-58
19	116-KE	Reactor Stack	Small	Contaminated with mixed fission products and plutonium	None	Interferes with access to waste sites 100-K-6, 130-KE-1, 100-K-46, 100-K-47, 100-K-53, 100-K-58
20	117-KE	Exhaust Air Filter Building	Major	Contaminated with mixed fission products and plutonium 2.5 mR/hr in inlet tunnel	Asbestos	Interferes with access to waste sites 116-KE-1, 100-K-46, 100-K-47, 100-K-53, 100-K-58
21	118-KE-2	Horizontal Control Rod Storage Cave	Small	Potentially contaminated with mixed fission and activation products	Mercury, lead, PCBs	
22	166-KE	Oil Storage Vault	Major	Potentially radiologically contaminated	Organic materials, solvents, fuel oil	Interferes with access to waste sites 130-KE-2, 100-K-48, 100-K-58, 120-KE-8
23	1614-KE	Environmental Monitoring Station	Small	Potentially radiologically contaminated	Lead, asbestos	
24	182-K	Emergency Water Pumphouse	Small	Radiologically contaminated	Lead, mercury, asbestos, ethylene glycol	Interferes with access to waste site 100-K-58
25	1701-K	Patrol Headquarters	Small	Potentially radiologically contaminated	Lead, asbestos	Interferes with access to waste sites 1607-K1, 100-K-58

**Table A-1. Summary of Facilities in the Scope of Action Memorandum for the 100-K Area Ancillary Facilities. (4 Pages)**

#	Facility	Name	Facilities <sup>a, b, c, d</sup>	Nature of Contamination		Associated Hazard
				Radioactive	Nonradioactive	
26	1720-K	Office and Telephone Exchange	Small/active	Potentially radiologically contaminated	Lead, asbestos	Interferes with access to waste sites 600-29, 1607-K1, 100-K-58
27	1909-K	Effluent Valve Pits	Major	Contaminated with mixed fission and activation products	None	

<sup>a</sup> Major facilities are the larger, multi-room structures, generally with extensive radiological and/or chemical contamination.

<sup>b</sup> Small facilities are small structures, generally with one to three rooms.

<sup>c</sup> Active facility is actively being used as of January 2005.

<sup>d</sup> The term "historic" indicates that the associated facility qualifies for consideration as a historically significant property in accordance with the *National Historic Preservation Act of 1966*.

PCB = polychlorinated biphenyl

**APPENDIX B**

**SUMMARY OF RESPONSES TO PUBLIC COMMENTS ON THE  
ENGINEERING EVALUATION/COST ANALYSIS FOR THE 100-K AREA  
ANCILLARY FACILITIES**

**Comments on DOE/RL-2004-43, Engineering Evaluation/Cost Analysis  
for the 100-K Area Ancillary Facilities**

**Commenter 1  
Richland, WA**

**General Comments:**

- 1. This report is, in general, an excellent document. The facilities are adequately described and their individual characteristics discussed. The cost analyses were presented in appropriate detail, for the most part, with a useful discussion of the current-year dollar estimates and the present-worth estimates. However, there are three areas where some additional information would be appropriate: waste disposal costs, durations of the postulated activities in each alternative, and analysis methodologies and cost bases used in the development of the cost estimates.*

*Waste disposal costs are shown explicitly in Table B-1 for deactivation, but do not appear explicitly in Table B-2. A further breakout of waste disposal costs for decontamination and decommissioning would be helpful to the reader.*

**Response:** Waste disposal costs are included in the Other Direct Costs (ODC) category and total to \$567,572. This total represents approximately 12% of the ODC values. The duration of the deactivation/D&D period was assumed to be 8 years. The duration of the S&M period for alternative 3 was assumed to be 26 years followed by deactivation/D&D (8 years duration). The rough-order-of-magnitude costs included in the EE/CA were developed using computer models based on the updated Micro Computer-Aided Cost Engineering System (MCASES) models established by U.S. Army Corps of Engineers.

- 2. The durations of the S&M period and the D&D period are not stated clearly anywhere. There are several statements that say 26 years is an appropriate duration for the S&M period, and there are some implications that 7 years might be required for D&D. However, Section 4.3.3 implies that a period of 30 years might be appropriate for the total S&M plus d/D&D period. Some clarification of these numbers would be helpful. A good place to put that clarification would be in Table ES-1. Adding a footnote to each of the present-worth costs which would indicate what durations were assumed and what net discount rates were assumed in the calculation of each of those costs would be appropriate. In addition, the schedule figure in Section 7 should be adjusted to illustrate the duration of the d/D&D period for Alternative 2, and the durations of the Preparations for S&M, long-term S&M, and d/D&D periods for Alternative 3.*

**Response:** The duration of the deactivation/D&D period was assumed to be 8 years. The duration of the S&M period for alternative 3 was assumed to be 26 years followed by deactivation/D&D (8 years duration). These clarifications are reflected in the action memorandum. The schedule in Section 7 is meant to show activities that are currently funded for completion. Budgets and schedules for the out years have not been developed at this time.

3. *There should be some supporting discussion and/or documentation of the actual work to be performed and of the methodologies and cost bases used to develop the cost elements for the individual facilities presented in Tables B-1 and B-2. The actual analyses made to develop the labor, materials, and equipment estimates should be available for inspection, either in appendices or in supporting referenced documentation.*

**Response:** The rough-order-of-magnitude costs included in the EE/CA were developed using computer models based on the updated Micro Computer-Aided Cost Engineering System (MCASES) models established by U.S. Army Corps of Engineers. The specific level of detail you suggest is not normally included in this type of document. A copy of the input values for the cost estimating models was put in information repository the 100-KR-2 Administrative Record on May 11, 2005.

**Commenter 2**  
**Richland, WA**

**Specific Comments:**

1. *The term 'cost-effective' is not hyphenated everywhere in the text.*

**Response:** The term "cost-effective" is only hyphenated in the text when it is used to modify a noun.

2. *Table ES-1: Suggest inserting 'Immediate' into the name of Alternative 2 in the table, and elsewhere in the text where appropriate.*

**Response:** Thank you for the suggestion.

3. *Add footnotes to Present-Worth values to indicate the assumed durations and discount rates used in each calculation.*

**Response:** Thank you for the suggestion. The EE/CA is not normally modified after public comment. The comment was provided the author of the Action Memorandum.

4. *Page 4-7, Section 4.4.2, 1st ¶, line 5: Suggest deleting 'offsite' and replacing it with 'non-radioactive disposal', since there may be an appropriate "clean" disposal site created for these materials on the Hanford Site.*

**Response:** Thank you for the suggestion. The language in the action memorandum has been clarified to describe particular types of waste disposal occurring on or off of the Hanford Site.

**Commenter 3**  
**Phoenix, AZ**

1. *These buildings and underlying soil should be "cleaned up" in the most secure way – assuming that all radioactive and other toxic materials be contained and/or treated to assure that no other location will be contaminated or recontaminated. D&D is good.*

**Response:** Final cleanup of underlying soils associated with the facilities is not the focus of this removal action. In the course of D&D some sites may attain final cleanup requirements, but typically building sites remain contaminated following demolition and are transferred to the remedial action program for final cleanup. Sites will be cleaned up in accordance with the appropriate remedial action required by the Tri-Party Agreement.

2. *Groundwater running into the Columbia River must be protected from further contamination and or treated, if necessary.*

**Response:** All demolition will be conducted using accepted industrial methods. Loose contamination will be fixed in place prior to demolition or controlled using fogging or misting during demolition. The demolition activities will not affect groundwater beneath the work areas and is not addressed in this action.

3. *The grand vision of "unrestricted" use of the land surface at Hanford is a pipe dream. Would that it could be true; however, some child would probably "find" a stash of nuclear materials the cleanup crews would leave behind! These are large areas.*

**Response:** The intent of this removal action is to remove all hazards and structures to facilitate future land-use options for the 100-K Area. We intend to follow rigorous cleanup methodologies to ensure that no "stash" of hazardous materials is left behind. The final soil cleanup levels (unrestricted versus restricted use) are not addressed by this removal action. Soil cleanup levels are addressed in the 100-KR-1 and 100-KR-2 OU RODs.

4. *Worker protection and downwinders protection is a must.*

**Response:** All demolition will be conducted safely, using accepted industrial methods. Loose contamination will be fixed in place prior to demolition or controlled using fogging or misting during demolition. Air monitors are located around the D&D site and regularly monitored to ensure there is no release of contaminants.

5. *In your short news releases, please tell us the ultimate disposition of the removed materials!*

**Response:** Low-level radioactive demolition wastes will be disposed at the Environmental Restoration Disposal Facility (ERDF) located in the Hanford Site 200 Area. Other waste materials that cannot be disposed at ERDF will be disposed at appropriate disposal facilities approved by the EPA at a future date based on the characteristics of the waste.

6. *Surveillance after demolition should also be funded. We hope there are no surprises!*

**Response:** The work areas continue under a limited surveillance and maintenance program until the sites are addressed in accordance with the appropriate remedial action required by the Tri-Party Agreement.

7. *Wildlife habitat (nests, underground burrows, etc.) should be protected.*

**Response:** Cultural and ecological reviews are conducted prior to demolition. Culturally sensitive areas and ecological communities are identified and the appropriate steps are taken to ensure they are protected.

#### **Commenter 4**

#### **E-Mail submittal**

1. *The announcement of the public comment period [Date: Wed, 20 Oct 2004 08:50:28 - 0700, From: "Chalk, Steven E" <Steven\_E\_Chalk@RL.GOV>, Subject: Cleanup of the 100-K Area Ancillary Facilities, To: HANFORD-INFO@listserv.wa.gov] suggests that the preferred D&D alternative "would allow unrestricted use of the land surface." I find no analyses nor considerations that support such a positive outcome. Nor is this positive outcome a conclusion or summary of the EE/CA. Correct.*

**Response:** The scope of the EE/CA includes removal of the facility/structures. Soils will be characterized for disposal purposes only. Generally, when you remove the structure a small amount of soils are included (approximately 3 feet [1 meter]) and disposed. The determination that soils are below a specified cleanup level is not stated or addressed by this EE/CA nor the action memorandum. Soils will be cleaned up in accordance with the remedial action required by the Tri-Party Agreement for the 100-KR-1 and 100-KR-2 operable units.

2. *Section 1.2.1 assumes a residential land-use scenario in regard to the underpinning Records of Decision (RODs) for this EE/CA. A residential land-use scenario is highly restricted, contrary to the claimed unrestricted use of the land surface.*

**Response:** The existing RODs are mentioned as a reference. Cleanup criteria for soils are addressed as part of the 100-KR-1 and 100-KR-2 OU RODs. The scope of the EE/CA is limited to evaluating options for removal/disposal of building and structures and soils that are part of the D&D activity. The D&D removal action may or may not result in meeting cleanup requirements that have already been established via the existing RODs.

3. *The extent of the D&D alternative is described in Sec. 4.2.2: "to 1 m (3.3 ft) below grade or below the engineered structure." The cited criteria are the RODs for residential land-use, not unrestricted surface use.*

**Response:** The document merely references the approved RODs that address soil cleanup in the 100-K Area.

4. *Remediation to minus one meter fails the Long-Term Effectiveness and Permanence Evaluation Criterion. Many uses of the land "surface" can be expected to involve secondary components deeper than one meter, for example building foundations and pipelines.*

**Response:** The EE/CA does not limit excavation under D&D to 1 meter. It is a guideline. Building foundations and pipelines will be removed unless it can be confirmed that they are below the established cleanup levels in the applicable 100-KR-1 and 100-KR-2 OU RODs. The primary objective of this removal action is the D&D of surplus facilities and structures in order to remove the associated hazards. Final soil cleanup will be accomplished in accordance with the remedial action required by the Tri-Party Agreement for the 100-KR-1 and 100-KR-2 operable units.

5. *Furthermore, native and exotic vegetation of arid lands has root systems penetrating to tens of meters. Therefore, some contamination left below one meter will be brought to the land surface by arid lands plants, where that contamination will already be in the food web. (See the attached WORD document "report 11/22/02 access" for comparable data for 300 Area.) This failure is in common with the D&D and the Surveillance and Maintenance (S&M) alternative. Therefore, both the D&D and S&M alternatives need to be reconsidered to meet the Long-Term Effectiveness and Permanence Evaluation Criterion. Please let me know if this comment is unclear or if you have questions.*

**Response:** The EE/CA does not evaluate options for final remediation of soils. Final soil remediation and confirmation that the soil is at or below required cleanup levels will be a part of other actions.

**Commenter 5**

**Salem, OR**

1. *Oregon appreciates the opportunity to review this proposal and offers the following comments for your consideration. We agree with and support the selection of the decontamination and decommissioning alternative. The selected alternative meets the remedial action objectives and supports the final clean-up decisions for the 100-KR-1,2 and 4 Operable Unit remediation processes.*

*As part of this EE/CA, DOE should hypothesize what groundwater changes are expected as a result of the actions taken in the EE/CA, and the recent action grouting the K-East basin pick-up chute. Monitoring should be performed to determine whether or not the hypothesis are correct, and to assess what impact these actions have had or will have on the groundwater pump and treats in the area and actions that may be needed in the near term to augment or restore these action.*

**Response:** Special precautions are taken during the removal action process to ensure the control of contaminants. Fixatives are applied to facilities and structures to ensure that contaminants are not released to the air or surrounding soil. When water is used to reduce the spread of contamination or fix contaminants in place, precautions are taken to ensure that no puddling, ponding, or runoff occurs; the Field Supervisor has the responsibility to monitor the use of water and fixatives to ensure that no puddling, ponding or runoff occurs. This removal action is limited to surface structures and limited excavation of below-grade structures. No impact to local groundwater is expected.

The grouting of the K-East basin pickup chute is not being performed under this removal action. At the end of removal action, soils are either stabilized and deferred to a later remedial activity, or it will be confirmed that they meet the cleanup requirements contained in the 100-K Area ROD(s).

2. *An EE/CA is an inappropriate place to propose to make irretrievable and irreversible commitment of resource decisions, beyond the simple consumption of resources. Decisions about residual contamination and future land restrictions must be deferred to the full Remedial Investigation/ Feasibility Assessment (RI/FS) and Record of Decision (ROD) process. EE/CA's do not contain sufficient analytical depth and do not have a sufficient public review process to substitute for the RI/FS process.*

**Response:** To clarify, the identification of any irreversible and irretrievable (I&I) commitment of resources by DOE is made in the EE/CA pursuant to NEPA law. CERCLA does not contain such a requirement, so the use of an EE/CA versus an RI/FS for this analysis is not in itself relevant.

With respect to the adequacy of the analysis in the EE/CA to support an I&I determination by DOE, NEPA indicates that the level of analysis should depend on the particular circumstances of the action. In this case, DOE believes that there has been substantial prior analysis (via the Comprehensive Land Use Plan EIS and 100 Area waste site CERCLA feasibility studies) of future land use and likely restrictions resulting from cleanup activities the 100 Area. Specifically, the Comprehensive Land Use Plan EIS (and associated ROD) identifies the likely future use of the 100 Area as recreation/conservation and the 100 Area waste site CERCLA feasibility studies (and

associated RODs) notify the public that residual contamination may require land use restrictions such as prohibitions on deep excavation. The I&I determinations made by DOE in the EE/CA are consistent with these previous analyses and additional analysis would appear to be unnecessary.

With respect to the level of public review, the 30-day review period for an EE/CA (with the option to extend to 45 days) is the same as that required for a CERCLA RI/FS or a NEPA environmental assessment. Similarly, the public distribution list for an EE/CA at the Hanford Site is the same as for an RI/FS. Therefore, an RI/FS would not provide a greater level of public involvement.

3. *We look forward to working closely with you as you develop the specific work plans. If you have questions regarding our comments, please contact Dirk Dunning at (503) 378-3187.*

**Response:** Comment noted.