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Removal Action Workplan for the Hanford Generating Plant Ancillary Facilities

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ACRONYMS

ACM	asbestos-containing material
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
BARCT	best available radionuclide control technology
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 decommissioning
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOT	U.S. Department of Transportation
DQO	Data Quality Objectives
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
HGP	Hanford Generating Plant
L&I	Department of Labor & Industries
MTCA	*Model Toxics Control Act*
NEPA	*National Environmental Policy Act of 1969*
PCB	polychlorinated biphenyl
PPE	personal protective equipment
RAW	removal action workplan
RCRA	*Resource Conservation and Recovery Act of 1976*
RESRAD	Residual Radioactivity Dose Model
RWP	radiological work permit
S&M	surveillance and maintenance
SAP	sampling and analysis plan
SWMU	Solid Waste Management Unit
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSCA	*Toxic Substances Control Act of 1976*
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*
WISHA	Washington Industrial Safety and Health Act

METRIC CONVERSION CHART

The following conversion chart is provided to aid the reader in conversion.

Into Metric Units

If You Know	*Multiply By*	*To Get*
Length		
inches	25.4	millimeters
inches	2.54	centimeters
feet	0.305	meters
yards	0.914	meters
miles	1.609	kilometers
Area		
sq. inches	6.452	sq. centimeters
sq. feet	0.093	sq. meters
sq. yards	.0836	sq. meters
sq. miles	2.6	sq. kilometers
acres	0.405	hectares
Mass (weight)		
ounces	28.35	grams
pounds	0.454	kilograms
ton	0.907	metric ton
Volume		
teaspoons	5	milliliters
tablespoons	15	milliliters
fluid ounces	30	milliliters
cups	0.24	liters
pints	0.47	liters
quarts	0.95	liters
gallons	3.8	liters
cubic feet	0.028	cubic meters
cubic yards	0.765	cubic meters
Temperature		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius

Out of Metric Units

If You Know	*Multiply By*	*To Get*
Length		
millimeters	0.039	inches
centimeters	0.394	inches
meters	3.281	feet
meters	1.094	yards
kilometers	0.621	miles
Area		
sq. centimeters	0.155	sq. inches
sq. meters	10.76	sq. feet
sq. meters	1.196	sq. yards
sq. kilometers	0.4	sq. miles
hectares	2.47	acres
Mass (weight)		
grams	0.035	ounces
kilograms	2.205	pounds
metric ton	1.102	ton
Volume		
milliliters	0.033	fluid ounces
liters	2.1	pints
liters	1.057	quarts
liters	0.264	gallons
cubic meters	35.315	cubic feet
cubic meters	1.308	cubic yards
Temperature		
Celsius	multiply by 9/5, then add 32	Fahrenheit

1.0 INTRODUCTION

This document is the removal action workplan (RAW) for the Hanford Generating Plant (HGP) ancillary facilities[1]. The facilities are located in the 100-N Area of the Hanford Site in Benton County, Washington. The 100 Areas (including 100-N Area) of the Hanford Site were placed on the U.S. Environmental Protection Agency's (EPA) National Priorities List under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). The U.S. Department of Energy (DOE) has determined that hazardous substances in HGP ancillary facilities present a potential threat to human health or the environment. DOE has also determined that a non-time critical removal action is warranted at these facilities.

Alternatives for conducting a removal action were evaluated in the *Engineering Evaluation/Cost Analysis (EE/CA) for the 100-N Area Ancillary Facilities and Integration Plan* (DOE-RL 1997). The evaluation resulted in the recommendation to decontaminate and demolish the ancillary facilities. The recommendation was approved in an action memorandum (Ecology et. al 1999) signed by the Washington State Department of Ecology (Ecology), EPA, and DOE. DOE is the agency responsible for implementing the removal actions in the 100-N Area. This RAW supports implementation of the removal action.

1.1 PURPOSE AND OBJECTIVE OF THE REMOVAL ACTION WORKPLAN

The purpose of this RAW is to establish the methods and activities to perform the following removal action functions:

- Complete decontamination and decommissioning (D&D) of the following ancillary facilities:
  - 185-N HGP Turbine Generator Building
  - 1701-NE Gatehouse
  - 1703-N Field Office Building
  - 1716-NE Maintenance Garage
  - 1802-N Pipe Trestle (185-N Building to fence)
- D&D of the 1908-NE HGP Outfall Structure and 181-NE HGP River Pumphouse (piping into the river will be left in place). Due to the sensitive location of these structures on the Columbia River, the benefit of any removal activity may be overshadowed by the need to protect endangered fish species. Therefore, if a potential future use for these structures can be established, they will be left in place following cleanup of any environmental issues.
- Cleanup of three solid waste management units (SWMU's) inside 185-N (SWMU #2 Oil Storage Area, SWMU #3 HGP Floor Drains, and SWMU #4 Turbine Oil Filter Units),

[1] The term "facilities" is used generically to encompass all the structures, buildings, tunnels, piping, etc., associated with the buildings.

one SWMU inside 1716-NE (SWMU #8 Maintenance Garage Floor), and one SWMU at 1908-NE (SWMU #7 Outfall Seal Well).

- Manage and dispose of all waste generated during these actions.

This document satisfies the requirement in the action memorandum (Ecology et al. 1999) that DOE submit a RAW outlining how compliance with applicable regulations (refer to Section 4.1) and enforceable schedule (refer to Section 5.1) will be achieved for the HGP ancillary facilities demolition. This RAW was prepared in accordance with Section 7.2.4 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1998).

In addition to this RAW, the action memorandum (Ecology et al. 1999) specifies other deliverables that must be submitted by DOE to the lead regulatory agency for review and approval. This RAW describes the deliverables and provides a schedule for meeting the deliverables. The specific deliverables specified in the action memorandum and discussed in this RAW include:

- Sampling and analysis plans for characterization and waste disposal (Section 4.3)
- Treatment plans if treatment is necessary prior to waste disposal in ERDF (Section 4.2.3)
- Verification sampling and analysis plans for soil and below-grade structures (Sections 4.3 and 5.4)
- Cleanup verification report (Section 5.4).

The HGP ancillary facilities are owned by Energy Northwest. The land under the HGP ancillary facilities is owned by DOE and is part of the 100-N Area. Currently, the responsibility for cleanup is being negotiated between Energy Northwest and DOE. Energy Northwest will be awarding and administrating the cleanup contracts for the HGP ancillary facilities. Therefore, the intent of this document is to identify the basis and provide guidance for the preparation of bid specifications.

The HGP project schedule (Appendix A), which encompasses the work scope to project completion, presents the logical progression of events and estimated durations for the ancillary facility.

1.2 SCOPE AND OBJECTIVES OF THE REMOVAL ACTION

The primary goal of CERCLA removal actions is to minimize or eliminate threats to public health or the environment caused by the presence of hazardous substances. The EE/CA for the 100-N Area Ancillary Facilities and Integration Plan (DOE-RL, 1994) presents four alternative approaches for future facility management and the resulting levels of protection of public health and the environment that may be anticipated. Based on the evaluation, the D&D of ancillary facilities were recommended as the most responsive approach to ensure protection of human health and the environment. The selection and approval of this approach is documented in the action memorandum (Ecology et al. 1999) for the 100-N Ancillary Facilities.

Stabilization, partial demolition, and disposal will reduce the potential hazards to public health or the environment that are currently posed by the HGP ancillary facilities. Waste products generated by the D&D will be disposed at appropriate disposal facilities.

Below-grade structures will be removed such that the structure will have a minimum of 1 ft of cover. Below-grade structures and soils, which are contaminated at levels above cleanup standards, will be removed. The 185-N Building and the affected surrounding terrain will be backfilled after completion of the removal action when the cleanup standards (see Sections 4.1 and 5.4) are met. Characterization information for these areas will be generated to document the status of conditions at the conclusion of this project.

Based upon the selected alternative, the removal action objectives are as follows:

- To the extent practicable, reduce potential future releases of hazardous substances contained within facilities to acceptable protection levels established in applicable or relevant and appropriate requirements (ARARs).
- Protect workers from the hazards posed by these facilities.
- Prevent adverse impact to cultural resources and threatened or endangered species.
- Safely manage (treat or dispose) waste streams generated by the removal action.
- Reduce or eliminate the need for future surveillance and maintenance (S&M) activities.

2.0 REMOVAL ACTION

The objective of the HGP project is to demolish the ancillary buildings. This will reduce the potential for release/exposure of hazardous and radioactive materials to workers, the public, and the environment. The project will also reduce periodic S&M costs incurred from maintenance of the degrading buildings.

2.1 REMOVAL ACTION WORK ACTIVITIES

The following sections provide a general description of how work activities will be performed on the HGP project.

The general scope of work involved to implement this removal action includes the following activities:

- Removing hazardous substances (chemical and radiological)
- Removing facility equipment and miscellaneous piping
- Dismantling various facility structures
- Disposing of waste
- Verification sampling
- Closeout report.

This scope will be accomplished by completing the activities described in the following subsections.

2.1.1 Site Mobilization and Preparation Work

Waste segregation and staging areas will be set up (within the area of contamination or at an on site location) to facilitate transportation of the material for recycling or disposal in accordance with the approved Waste Control Plan. Supervisor trailers, lunch trailers, change trailers, office trailers, mobile shower trailers, and restroom facilities may also be mobilized, as necessary, at the site by the contractors performing D&D activities. Electrical power is presently available at the site. Occupational Safety and Health Administration concerns, (e.g., fall protection, guarding, and electrical) will be managed by the contractors as they are identified.

2.1.2 Characterization

Characterization, via sampling and analysis of materials and radiological surveys, will be conducted throughout the D&D of the ancillary facilities. The approved Sampling and Analysis Plan will be used to identify radiological and hazardous conditions that will be encountered in facility operations and to identify health and safety concerns and the waste streams that will be generated. Technical services will be used to characterize waste for treatment and disposal and to verify facility and area conditions at various phases of project completion. Section 4.3 describes characterization in further detail.

2.1.3 Decontamination and Demolition

Work activities, in general, will start in the radiological controlled areas. One of the first types of work activities inside the building will include conducting radiological surveys. Radiological surveys will be performed using hand-held and large area detection equipment. After an area has been surveyed and the radiological conditions have been established, cleanup will commence.

Section 4.2 discusses how waste will be managed. At this time, asbestos-containing materials (ACMs) and presumed ACMs will be removed. ACM typically consists of insulation for piping, floor tiles, cement asbestos board, etc. Insulation on piping will be removed as Class I asbestos work, and all other ACM in the facilities will be removed as Class II (e.g., floor tiles and cement asbestos board). Asbestos work, air monitoring, and worker safety requirements will conform to the regulations governing ACM removal and will be described in detail in the asbestos subcontractor abatement work plan. Non-radioactive ACM is in the process of being removed from 185-N, 1703-N, 1802-N, 181-NE and 1908-NE. The ACM will be disposed at an approved facility. The 1701-NE Gatehouse and the 1703-N Field Office Buildings have been demolished to slab elevation.

Polychlorinated biphenyls (PCBs) in oil from transformers and light ballasts, mercury found in lighting components and switches, and other hazardous materials will be removed and disposed of as hazardous or mixed waste, or recycled consistent with guidelines found in Section 4.2.

The loose, accessible radiological contamination will be either removed or fixed in place, depending upon the levels, accessibility, complex shapes (e.g., grating) and type of contamination found. Some equipment/piping will be removed, and loose contamination will be wiped or vacuumed. If loose contamination remains after the initial decontamination effort or if the facilities configuration or conditions make removal of loose contamination impractical, then the contamination may be fixed in place, as required. Activities that have a potential to emit radiological emissions are discussed in Appendix B. The above-grade structures will be demolished using standard demolition techniques. Steel will be segregated for salvage if economically feasible, unless it is determined to be contaminated. Below-grade areas of the buildings that meet the cleanup criteria, defined in Sections 4.1, 4.4, and 5.4, will be left in place and voids will be backfilled with clean debris or soil.

2.1.4 Waste Disposal

All waste management activities will be performed in accordance with waste management ARARs identified in the action memorandum (Ecology et al. 1999) for the 100-N Area Ancillary Facilities and Integration Plan (DOE-RL, 1994). Disposal of waste from this action will either be sent to ERDF or an EPA-approved offsite disposal facility. Treatment of waste may be necessary prior to disposal at the ERDF, and waste may be stored at ERDF with lead regulatory agency concurrence if the waste is awaiting treatment. Certain material is eligible for salvage and recycling, which is encouraged if the appropriate regulatory requirements are met and it is economically feasible for the project to do so. Liquid waste will either be sent to the Hanford Site's Effluent Treatment Facility (ETF) or treated to meet the acceptance criteria of the receiving facility. Section 4.2 discusses waste management in further detail.

2.1.5 Site Restoration

Upon completion of demolition activities, if verification sampling of the site indicate that cleanup levels have been met, below-grade void spaces will be backfilled with nonhazardous/nonrecyclable material (e.g., clean concrete rubble and/or soil). Approximately the top 0.6 m to 1 m will be backfilled with soil containing no greater than 20 percent cobble to facilitate future revegetation of the site. The backfill will be obtained first from the spoil pile that was created when the facility was originally excavated. As some of the original material was used to grade the general area, an additional amount of material will be taken from the area between the facility and the river road at a maximum depth of approximately ten feet resulting in a very gentle slope over the large area. As a result, the final grade of the site will be returned as near as possible to the original condition before construction of the facility began in 1963. It is not intended to use borrow pits in the area unless sufficient soil containing less than 20 percent cobble is needed to promote vegetation growth at the surface.

2.1.6 Demobilization

After verification sampling has been completed and the site has been graded consistent with surrounding terrain, trailers, equipment, and personnel will be demobilized from the facility. Project closeout requirements are discussed in Sections 4.1 and 5.4.

2.2 FACILITY HAZARDS

The following section is a summary of the *Preliminary Hazard Classification for the Hanford Generating Plant (HGP)* document (BHI 1999a), which discusses the inventory of radiological and non-radiological hazardous substances within the HGP facilities. The HGP facilities contain mercury, PCBs, lead, asbestos, and select radioactive hazard substances.

2.2.1 Hazardous Material Inventory

Mercury exists in glass tubes within Mercoid switches and in manometers located in the control room. PCBs may be found in the transformers, surge capacitors, and light ballasts. Lead exists in the form of batteries and seals on waste piping. Asbestos contaminated materials (ACM) exist on interior and exterior portions of the facilities. ACM exists in the form of pipe and equipment insulation, floor tiles, paint, and electrical cable insulation.

The radioisotopes that were found within the HGP facilities were Co-60, Cs-137, and Sr-90. The contamination was found within various forms of equipment, piping, tubing, valves and tanks.

The potential for release of the hazardous substances mentioned above is minimal because all hazardous substances will be removed in accordance with approved procedures and standards that assure control over hazardous substances. These procedures and standards are intended to ensure that personnel control, handling, and disposal of radiological and non-radiological hazardous substances are performed in a manner that achieves the following objectives:

- Protects the safety of employees and the general public

- Minimizes spills and releases to the environment
- Meets applicable DOE, federal, state, and local regulatory requirements.

Solvents, grease, oils (i.e., hydraulic oil and fuel), and aerosol containers have also been found throughout the facilities. Although the majority of these items were disposed of during deactivation, the potential exists for personnel to find containers with residual chemical constituents. If such containers are found, the containers will be managed in accordance with Section 4.2.

2.2.2 Facility Hazard Classification

A facility classification, required for DOE facilities per DOE Order 5480.23 (DOE 1992), is an analysis of a facility that analyzes hazardous and radiological inventory. This inventory is analyzed to determine what is releasable; these levels are then compared to the reportable quantity levels listed in 40 CFR 302, Table 302.4 and its corresponding appendices. BHI-DE-01, *Engineering Department Project Instruction,* EDPI-4.28.01, "Hazard Classification," establishes the basis for classifying a facility and appropriate actions if a change in inventory is significant enough to change the facility classification or authorization basis.

Based upon the radiological and non-radiological substance inventories and the approved methods of removal, the hazards associated with these activities were classified as **Non-Nuclear, Low Hazard**. No additional safety analysis documentation is required.

2.3 STRUCTURES, SYSTEMS, AND COMPONENTS THAT PROTECT FACILITY WORKERS

Controls that will be employed during the HGP project include temporary confinement enclosures, glovebag containments, and personal protective equipment (PPE), as directed by the health and safety plan (HASP), radiological work permits (RWPs), or asbestos abatement work plan for asbestos removal. Personnel monitoring and area monitoring will be used as required to determine and document worker exposures and work conditions.

Temporary confinement enclosures will be constructed, as required, to contain potential spread of contamination. One standard type of temporary confinement is glovebag enclosures. Glovebag enclosures will be essentially one-use protective measures used to prevent contamination release during specific operations (e.g., pipe cutting and sample collection). Glovebags are available in a variety of sizes and designs and will be ordered to tailored specifications in accordance with ARAR's and their intended uses.

3.0 SAFETY AND HEALTH MANAGEMENT AND CONTROLS

3.1 EMERGENCY MANAGEMENT

Activities will be conducted 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. Each contractor will be responsible for establishing an emergency response organization capable of planning for, responding to, and recovering from industrial, security, or hazardous material incidents as appropriate. Emergency response will be provided by the Hanford Fire Department.

3.2 HEALTH AND SAFETY PROGRAM

3.2.1 Worker Safety Program

All subcontractors will comply with the requirements of 29 CFR 1910.120, 10 CFR 835, and State and Federal Regulations to ensure the safety and health of workers during hazardous waste operations.

3.2.2 Radiological Controls and Protection

The Radiological Controls and Protection Program is defined in DOE-approved Energy Northwest procedures. This program implements the DOE policy to reduce safety or health risks to levels that are ALARA and to ensure adequate protection of workers. Energy Northwest Radiological Protection Program meets the requirements of 10 CFR 835. Appropriate dosimetry, RWPs, PPE, ALARA planning, periodic surveys, and radiological control technical support will be provided.

Energy Northwest controls for work in radiological areas has been assessed as adequate to control project activities. These controls provide for radiological controls planning that identify the specific conditions and 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 radiological control. The ALARA planning process may identify shielding requirements, contamination control requirements (including local ventilation controls), radiation monitoring requirements, and other radiation control requirements for the individual tasks conducted during the course of the projects. At this time, there are no existing or anticipated shielding requirements due to the low radiation levels in the facilities.

Measures are also taken to minimize the possibility of releases to the environment. Appendix B will quantitatively address the radionuclide inventory and activities that could cause potential release of this inventory, but not to the exclusion of the DOE Radiological Control Manual (DOE 1994b) or 10 CFR 835 requirements. Potential radiological air emissions are discussed in Appendix B.

4.0 ENVIRONMENTAL MANAGEMENT AND CONTROLS

4.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section describes how each of the ARARs identified in the action memorandum (Ecology et. al 1999) will be met, to the extent practicable, during the removal action.

- The *Model Toxics Control Act* (MTCA) (Method B), WAC 173-340, is applicable and specifies that cleanup actions must be protective of human health and the environment, comply with applicable state and federal regulations to the extent practicable, and provide for compliance monitoring. The cleanup standards apply to soil, structures, and debris encountered during the removal action. Groundwater protection standards also apply, should contaminated soil or structures remain in place below 4.6 m.

  The MTCA cleanup standards for hazardous constituents in soil will be met for structures and/or demolition debris remaining after completion of the removal action. The MTCA cleanup levels will be met for soil waste sites remediated during the removal action.

  Achievement of these cleanup standards will be verified through application of the MTCA Cleanup Levels and Risk Calculations (CLARC) Method B Formula Values for soil (Ecology 1996). Specific cleanup and verification values for the constituents of concern will be developed during the data quality objectives (DQO) process, and lookup values will be included in the appropriate sampling and analysis plans (SAPs).

- RCRA, Subtitle C, is applicable regarding the generation, transportation, storage, treatment, and disposal of hazardous waste. Hazardous waste management regulations promulgated pursuant to RCRA are codified in 40 CFR 260 through 268. Regulations established under RCRA are applicable to any hazardous waste generated during the removal action. In addition, the State of Washington's "Dangerous Waste Regulations" (WAC 173-303), which address the state program authorized under RCRA, are applicable for dangerous wastes encountered during the removal action. Additionally, this regulation applies for land disposal restricted waste, generator requirements, and transportation of hazardous wastes during the removal action.

  Disposition of hazardous substances from the facilities will be conducted in accordance with the waste generator requirements of RCRA, Subtitle C (40 CFR 262) and WAC 173-303, including waste designation, waste storage prior to disposal, and disposal restrictions. Waste disposal will also be governed by the requirements of the RCRA land disposal restriction (40 CFR 268); radiological waste land disposal requirements of 10 CFR 61, Subpart C; and the ERDF waste acceptance criteria (BHI 1996) for onsite disposal.

- The *Toxic Substances Control Act of 1976* (TSCA) (40 CFR 761) regulates the management and disposal of PCBs and PCB waste. All waste suspected to contain PCBs

will be evaluated to determine if it meets ERDF waste acceptance criteria (BHI 1996). Any PCB waste that does not meet ERDF waste acceptance criteria will be disposed of offsite at an EPA-approved facility capable of accepting TSCA waste.

- "U.S. Department of Transportation Requirements for the Transportation of Hazardous Materials" (49 CFR 100-179) are applicable for any wastes transported from the Hanford Site.

- The *Hazardous Materials Transportation Act* is applicable for transportation of potentially hazardous materials, including samples and waste. All offsite shipments for disposal will comply with the applicable packaging, marking, labeling, and shipping requirements. Any shipment of potentially hazardous materials, either onsite or offsite, will also comply with *the Hazardous Materials Transportation Act.*

- The *Clean Air Act* (40 CFR 61) is applicable to releases of airborne contaminants that may occur during the removal action, as well as the air monitoring requirements for these contaminants. Specifically, Subpart H provides the standards to ensure emissions from radionuclides are minimized during collection, processing, packaging, and transportation. These standards are applicable to radionuclides that may be encountered during the removal action to prevent exceeding 10 millirem/year (mrem/yr) effective dose equivalent to any member of the public. Subpart M, along with the Occupational Safety and Health Administration (29 CFR 1910.1101 and WAC 296-62), contains regulations pertaining to the removal and disposal of asbestos and ACM and provides special precautions to prevent exposure of workers to airborne emissions of asbestos fibers. Compliance with these regulations during the removal action will satisfy the requirements of these ARARs.

- "Radiation Protection—Air Emissions" (WAC 246-247) is applicable to the release of airborne radionuclides that may occur during the removal action, as well as the air monitoring requirements and best available radionuclide control technology (BARCT).

  The Washington State Department of Health regulations govern the release of airborne radionuclides (WAC 246-247). Quantifying radioactive emissions, implementing BARCT, and performing air monitoring for emission verification have been identified as substantive requirements. Appendix B provides detailed information demonstrating how these requirements will be met. The calculated unabated offsite dose to the maximally exposed individual (MEI) was calculated to be 1.58×10^{-4} mrem/yrat a distance of 18,095 m to the east. Therefore, this activity is not subject to the substantive requirements of 40 CFR 61, Subpart H (i.e., National Emission Standards for Hazardous Air Pollutants compliant monitoring). However, periodic confirmatory measurements, as described in Appendix B, will be conducted.

- "General Regulation for Air Pollution Sources" (WAC 173-400) and "Controls for New Sources of Toxic Air Pollutants" (WAC 173-460) are applicable to the release of toxic air pollutants that may occur during the removal action, as well as the air monitoring requirements and best available control technology for toxics.

- The *Safe Drinking Water Act of 1974* and "National Primary Drinking Water Regulations" (40 CFR 141, Subpart B) for public drinking water supplies establish cleanup goals that are protective of groundwater. Although the removal action does not directly address groundwater cleanup in the 100-N area, below-grade structures, soil, and demolition debris to be left in place will be remediated to meet standards that are protective of groundwater. Protectiveness will be verified by ensuring that soil cleanup levels for materials left in place allow compliance with maximum contaminant levels (MCLs) for hazardous constituents and 4 mrem/yr for radiological constituents in groundwater. The RESRAD dose models will be used to verify protectiveness with regard to radiological constituents, as described in Section 4.4. Soil not addressed by this removal action in the vicinity of the facilities that may be contaminated will be addressed in the final remedial action for the 100-N operable units.

- The *Clean Water Act of 1977*, as implemented by WAC 173-200-216, establishes cleanup goals that address protection of the Columbia River. Erosion and stormwater controls will be used as necessary during and following the removal action to prevent waste water/stormwater discharges directly to the Columbia River. Building material, soil, and demolition debris to be left in place will meet standards that are protective of the Columbia River. Verification of protection of the Columbia River will be achieved by ensuring soil cleanup levels for materials left in place allow compliance with MCLs for hazardous constituents and 4 mrem/yr for radiological constituents in groundwater.

- The *Archeological Resources Protection Act of 1979* (43 CFR 37) would govern the protection of any significant artifacts that may be found during the removal action. Because of the extensive disturbance resulting from construction of the facilities, it is unlikely that archaeological remains will be found in the footprint of the facilities (Neitzel 1997). However, if archeological remains are discovered, a mitigation plan will be developed in consultation with the appropriate authorities. Section 4.4, "Natural and Cultural Resources Protection," discusses this subject in more detail.

- The *Endangered Species Act of 1973* (implementing regulations of 50 CFR 402) and WAC 232-012-297 prohibit activities that threaten the continued existence of listed species or that destroy critical habitat. Threatened and endangered species are known to be present in the 100 Areas, but no adverse impacts on protected species or critical habitat is anticipated from activities associated with the removal action. An ecological review will be conducted prior to demolition to identify any potential impacts. If potential impacts are discovered, an appropriate mitigation plan will be developed and implemented.

- The *Native American Graves Protection and Repatriation Act* (implemented via 40 CFR 10) requires agencies to consult and notify culturally affiliated tribes when Native American remains are inadvertently discovered during project activities. It is unlikely that the removal action would inadvertently uncover human remains. If human remains are encountered, the pre-established procedures, documented in the *Hanford Cultural Resource Management Plan* (PNL 1989), will be followed.

4.1.1 Other Criteria, Advisories, or Guidance to Be Considered for this Removal Action

In addition to the ARARs identified in the action memorandum (Ecology et. al 1999) and discussed in Section 4.1 the following criteria, advisories, and guidance will be complied with in accordance to the action memorandum (Ecology et al. 1999) during implementation of the removal action. These materials, while not promulgated as regulations, are important to protect human health and the environment, and to protect workers during the implementation phase.

- *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination* (EPA 1997a) is an EPA policy statement that provides clarifying guidance for establishing cleanup levels for radioactive contamination at CERCLA sites. The statement provides guidance regarding protection of human health and does not address levels necessary to protect ecological receptors. It should be noted, however, that for most radionuclides, remediation goals that are protective of human health are also considered protective of ecological receptors. The guidance indicates that cleanup levels should consider exposure from all pathways and through all media (e.g., soil, groundwater, surface water, sediment, air, structures, and biota). The policy statement establishes a human health risk range of 10^{-4} to 10^{-6}, which is roughly equivalent to 15 mrem/yr effective dose equivalent as the maximum dose limit for humans. It further states that background should be determined on a site-specific basis. Although not an ARAR, the cleanup standard in the EPA policy statement must be addressed to satisfy the threshold criterion for protectiveness.

  Consistent with the risk range, EPA has considered cancer risk from radiation in a number of different contexts and has concluded that levels of 15 mrem/yr above background are protective of human health and the environment. Additionally, the risk to groundwater may not exceed 4 mrem/yr from all sources and may not exceed the maximum concentration limit for groundwater. In general, below-grade structures will be removed to a minimum of 1 foot below surrounding grade. However, if any of the cleanup factors cannot be met, the portions of the below-grade structures and soils above cleanup levels will be removed. Such waste sites will meet the rural residential cleanup scenario as previously agreed to in the Remedial Design Report/Remedial Action Workplan for the 100 Area. In the event that large volumes of contaminated soil are encountered or removal of contaminated soil inhibits reactor safe storage activities, with concurrence by the lead regulatory agency, the removal of contaminated soils may be deferred to the remedial actions program (Ecology et al. 1999).

- The ERDF waste acceptance criteria (BHI 1996) and *Supplemental Waste Acceptance Criteria for Bulk Shipments to the Environmental Restoration Disposal Facility* (BHI 1997b) delineate primary requirements including regulatory requirements, specific isotopic constituents and contamination levels, the dangerous/hazardous constituents and concentrations, and the physical/chemical waste characteristics that are acceptable for disposal of wastes at ERDF. Prior to disposal, waste will be evaluated to ensure that the waste meets ERDF waste acceptance criteria.

- *Revised Procedures for Planning and Implementing Off-Site Response Actions* (EPA 1987) provides procedures for offsite disposal of CERCLA wastes. Although it is

anticipated that waste generated by the removal action will be disposed on site, these procedures will be implemented for any offsite disposal that would be required.

- *Hanford Site Solid Waste Acceptance Criteria* (FDH 1998) identifies criteria for acceptance of waste at the CWC and ETF.

- "Radiation Protection Guidance for Exposure to the General Public" (59 FR 66414) provides EPA protection guidance recommending that (non-medical) radiation doses to the public from all sources and pathways not exceed 100 mrem/yr above background. It also recommends that lower dose limits be applied to individual sources and pathways. One such individual source is residual environmental radiation contamination after the cleanup of a site. The removal action will meet a 15 mrem/yr effective dose equivalent goal, excluding nearby waste sites to be addressed by the remedial action program.

- "Occupational Radiation Protection" (10 CFR 835) establishes radiation protection standards, limits, and program requirements for protecting workers from ionizing radiation resulting from the conduct of DOE activities. It also requires that measures are taken to maintain radiation exposures ALARA. A combination of PPE, personnel training, physical design features (e.g., confinement, remote handling, and shielded containers), and administrative controls (e.g., limiting time in radiation zones) would be used to ensure that the requirements for worker and visitor protection are met. In addition, the requirements to maintain exposure ALARA will be achieved by decontaminating surfaces to the extent practicable prior to demolition and by providing PPE, training, and administrative controls. For surfaces that could not be adequately decontaminated, fixatives would be applied to contaminants to ensure exposure ALARA. Individual monitoring would be performed as necessary to verify compliance with the requirements.

- Exposure limits, personnel protection requirements, and decontamination methods for hazardous chemicals are established by 29 CFR 1910. Additionally, the regulation requires identification and mitigation of physical hazards to workers posed by a facility including, but not limited to, confined spaces, falling hazards, fire, and electrical shock. The regulation provides requirements for worker safety during construction activities.

- *Radioactive Waste Management* (DOE 1998) provides the requirements for managing low-level radioactive waste. These requirements are applicable to managing low-level radioactive waste encountered during this removal action.

- It is the DOE's interpretation that *National Environmental Policy Act* (NEPA) (DOE 1997) requires CERCLA documents to address values of NEPA. The EE/CA (DOE/RL-97-22, Rev. 1), a CERCLA document, incorporated NEPA values to the extent practicable.

- Tri-Party Agreement (Ecology et al. 1998) contains provisions governing RCRA and CERCLA cleanup activities at the Hanford Site and provides guidance on integrating RCRA and CERCLA requirements to the greatest extent practicable. These provisions

are applicable during this removal action, and the requirements have been identified and addressed through the ARARs, as well as documented in the project schedule.

4.2 WASTE MANAGEMENT

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 purposes of this section. The preamble to the National Contingency Plan (40 CFR 300.165) 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 facilities in the 100 Areas addressed by this RAW and the various disposal/storage facilities such as the ERDF, CWC, and ETF, which are in the 200 Area, are considered as a single site for response purposes under this RAW.

Waste management activities will be performed in accordance with waste management ARARs identified in the action memorandum (Ecology et al. 1999) for the 100-N Area Ancillary Facilities and Integration Plan (DOE/RL-97-22, Rev. 1) and discussed above in Section 4.1. The requirements specified by the ARARs and other applicable guidance will be addressed in a site-specific waste management instruction. The site-specific waste management instruction will address waste storage, transportation, packaging, handling, and labeling as they specifically apply to waste streams.

In conducting the removal action, various waste steams will be generated. Each waste stream will require specific processing and disposal. These waste streams may include the following:

- Solid waste
- Hazardous, dangerous, and PCB wastes
- Low-level radioactive waste
- Mixed waste (waste that is both low-level radioactive waste and hazardous waste)
- Used oil
- Asbestos

4.2.1 Waste Characterization and Designation

Waste generated will be characterized and designated in accordance with the requirements of the receiving facility and in accordance with the approved sampling and analysis plan (SAP). Waste will be segregated by radioactive content, physical form, and chemical form. The generation of waste will be minimized to the maximum extent practical.

Waste destined for one of the Project Hanford Management Contractor (PHMC)-controlled facilities will be designated and characterized in accordance with *Hanford Site Solid Waste Acceptance Criteria* (FDH 1998), and the approved SAP.

4.2.2 Waste Handling , Storage, and Packaging

In general, disposal of waste generated from the removal actions discussed in this Workplan will either be disposed to ERDF or an EPA-approved offsite disposal facility. Treatment of waste may be necessary prior to disposal at ERDF. Liquid waste shall either be sent to Hanford's ETF or shipped offsite to an EPA-approved facility. Ecology approval will be obtained prior to disposal of any waste streams sent to ETF. Specific details on waste handling, storage, and packaging for the variety of wastes that may be encountered during the removal actions are discussed below.

Waste minimization practices will be followed to the extent technically and economically feasible during all phases of waste management. Waste materials will be recycled, reused, or reclaimed when feasible. 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 wastes that will be generated.

Asbestos will be adequately wetted and double-bagged or double-wrapped in plastic, according to the regulations governing asbestos abatement. Cut-and-wrapped pipe will be packaged to meet the requirements of the waste shipping and receiving plan (WSRP) for asbestos on pipe.

Biological wastes will be packaged in strong-tight containers that will not leak during storage.

Generally, liquids will be collected in 55-gallon UN1A2 drums. However, the size of the container (e.g., 15-, 30-, 55-gallon) may vary depending on the volume of material to be packaged. Signs stating, "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT," will be posted at each entrance of the storage area and along the boundary as necessary to be seen from any approach to the area. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause the container to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 30-inch separation will be maintained between container rows. A row of containers will be no more than two containers wide.

If waste is encountered for which there is no available treatment, DOE will meet with the regulatory agencies to determine the appropriate action for the waste stream. The preference for treatment of large-volume waste streams is ETF. ERDF will only be used when small volumes of waste needing treatment are encountered. Mixed (hazardous and radioactive) liquids may be treated and shipped to ERDF. Non-radioactive, non-hazardous liquids will be shipped or utilized for reuse or recycle. Hazardous liquids (non-radioactive) will be treated and shipped to ERDF or, with lead regulatory agency approval, offsite for disposal.

Smaller items contaminated with mixed (radioactive and dangerous/hazardous) solids will be packaged in 55-gallon drums (UN1A2). The weight will not exceed 850 lbs. Larger pieces (bricks, sheets, etc.) shall be double-wrapped in plastic and palletized.

Demolition concrete will be reduced to approximately 1 square foot. Loose rebar will be reduced to lengths of approximately 4 feet. Size reduction is to prevent materials from becoming lodged and/or damaging the ERDF transport containers. Structural pieces will be sized to fit to ensure ERDF acceptance criteria (BHI 1996) are met.

All containers, packages or items requiring storage in a Radioactive Material Area (RMA) will be marked/labeled with radioactive material markings and unique consecutive identification numbers. Containers or packages of waste requiring tracking (e.g., hazardous, mixed) will be assigned a Package Identification Number (PIN) by a Waste Transportation Specialist (WTS).

Non-radioactive solid items will be packaged in 55-gallon drums (UN1A2). Larger items will be double-wrapped in plastic and palletized. Radioactive solids will be placed in bulk roll-off containers with side-swinging gates (400 and 700 series) utilized for ERDF disposal. The containers will be lined with plastic sheeting in addition to the tarp cover. Lightweight material such as paper and plastic will be bagged prior to placing in the container to eliminate the potential of blowing out of the container.

Non-radioactive solids that are designated as dangerous waste and that do not meet ERDF waste acceptance criteria may, with lead regulatory agency approval, be shipped as dangerous waste offsite or to the 1100 Area excess yard or the 400 Area Consolidation Center if the material is recyclable. Lead regulatory agency approval will be obtained to ship PCB (TSCA) waste to offsite TSCA disposal facilities.

Waste areas containing PCB waste oils will be marked with signs stating, "DANGER-UNAUTHORIZED PERSONNEL KEEP OUT" posted at each entrance and along the boundary as necessary to be seen from any approach to the area. The M_L marking (Caution-Contains PCBs) will also be posted. Portable fire extinguishers and spill-control equipment will be available. Containers will not be opened, handled, or stored in a manner that may rupture the container or cause it to leak. Containers in poor condition will have the contents transferred to a container in good condition. A minimum 30-inch separation will be maintained between container rows. A row of containers will be no more than two containers wide.

Storage of all containers (except for those used to collect fluorescent light tubes) will be closed and secured when not being filled or emptied. Radioactively contaminated waste will be stored in a Radioactive Materials Area (RMA) that is established, managed and maintained in accordance with Energy Northwest procedures. Waste containers will be stored and secured to prevent the accumulation of water.

Any Investigation-Derived Waste (IDW) will be managed in accordance with *Strategy for Management of Investigation-Derived Waste* (Ecology et. al. 1995).

4.2.3 Waste Treatment

Treatment of waste streams may be necessary to provide for safe transport or effective disposal. The type of treatment and the location where treatment will be accomplished will be determined by the Tri-Parties on a case-by-case basis, in accordance with the substantive requirements of RCRA and WAC 173-303. Upon regulatory agency approval, solidification, encapsulation, neutralization, and size reduction/compaction may be employed to treat various wastes. Other treatment methods may be considered if necessary. For wastes requiring treatment, the techniques will be documented in site-specific waste management instructions or equivalent treatment document, which will be approved by the regulators.

4.2.4 Waste Transportation and Shipping

Subcontractors will be responsible for using and maintaining appropriate transport motor vehicles and providing qualified commercial drivers for waste generation. All shipments will be made in accordance with DOT regulations, 49 CFR 171-179.

4.2.5 Disposal

Disposal of waste from this action will either be sent to ERDF or an EPA-approved offsite disposal facility. Treatment of waste may be necessary prior to disposal at ERDF. Certain material is eligible for salvage and recycling, which is encouraged, provided that the appropriate regulatory requirements are met and that it is economically feasible for the project to do so. In addition, materials shipped offsite for salvage or recycle must be certified free of radioactive contamination in accordance with Energy Northwest's material release program, as discussed in Section 4.4. Liquid waste will either be sent to Hanford's ETF or treated to meet the acceptance criteria of the receiving facility. Ecology approval is required prior to shipping contaminated water to ETF for treatment. *Hanford Site Solid Waste Acceptance Criteria* (FDH 1998) identifies criteria for acceptance of waste at the CWC and ETF. BHI 1996 and BHI 1997b provide waste acceptance criteria for the ERDF.

4.2.6 Waste Management Strategy

Basic waste management strategies are discussed below; however, if other more cost-effective methods become available, they may be used. Throughout the project, material will be recycled whenever possible, assuming that it is economically feasible for the project.

- **Solid waste:** Solid waste will be managed in accordance with WAC 173-304 with an emphasis on recycling or reuse to the maximum extent possible. Uncontaminated demolition debris that can not be recycled will be used to fill void spaces created by demolishing the facilities. All materials released offsite for disposal, recycle, or salvage must be certified free of radioactive contamination in accordance with Energy Northwest's materials release program.

- **Low-level radioactive waste:** Low-level radioactive waste that meets ERDF waste acceptance criteria (BHI 1996) will be disposed of at the ERDF.

- **Mixed waste:** RCRA mixed waste will be managed in compliance with the requirements for both hazardous/dangerous wastes (WAC 173-303) and radioactive waste (10 CFR 61). Where treatment is deemed not feasible, lead regulator approval will be obtained to ship waste to an approved TSD facility. If mixed waste streams are found in quantities large enough to make treatment a viable option, mixed wastes may be treated to meet applicable land disposal restrictions and disposed of at the ERDF. Small volumes may be treated or accumulated for later treatment.

- **Used oil**: All used oil identified at this time is nonradioactive. The preferred strategy is to manage the oil (except for PCB oils) as a recyclable material.

- **Hazardous/dangerous wastes**: Hazardous/dangerous wastes in the facilities consist primarily of mercury, lead, and PCBs. Some forms of mercury can be treated as a recyclable material if not radioactive. If any of these wastes are found to be radioactive, they will be treated as mixed waste. Waste that cannot be treated to meet the ERDF waste acceptance criteria may be shipped to an offsite TSD facility, contingent upon the waste meeting the offsite disposal facility's waste acceptance criteria and obtaining an offsite determination of acceptability by the EPA. In addition, waste shipped offsite for disposal will be certified free of radioactive contamination in accordance with Energy Northwest's material release program.

4.3 SAMPLING AND ANALYSIS PLAN

Analytical assistance was used initially during the HGP facilities decommissioning to identify radiological and hazardous conditions that would be encountered in facility operations, and to specify the waste streams that would be generated. These technical services will also be used to characterize waste for disposal and to verify facility and area conditions at various phases of project completion. Analytical data generated in these efforts will be used to develop the following information:

- Contaminant identification
- Contaminant concentrations
- Waste type categories
- Worker health and safety conditions
- Decontamination requirements
- Operational precautions
- Waste treatment requirements
- Waste packaging and disposal requirements
- Volume.

Sample collection in support of these analytical studies will be performed at specific periods during decommissioning to provide current facility condition information and at random instances to develop knowledge of unanticipated findings. Sampling events will be performed throughout the duration of the decommissioning activities. It is desirable that sampling events be scheduled just prior to specific operations so the information developed is current to existing facility conditions. It is common for radiological conditions to change significantly during

decommissioning operations. Planned analytical sampling will basically fall into one of the following categories.

4.3.1 Initial Characterization

Initial characterization of the HGP facilities started with a review of historical information, including the review of old procedures, technical manuals, drawings, photographs, and occurrence reports; interviews with retired personnel familiar with early Hanford Site operations; and review of radiological surveys and old waste disposal records. A walkthrough of the facility was conducted to visually identify potential sample points such as stains, leaks, low points in systems, and other potential collection points for contamination or hazardous substances. A draft characterization plan was then developed using information gained from the historical review and facility walkthrough.

4.3.2 In-Process Characterization

The initial characterization plan collected information that was used for waste designation purposes. Some in-process sampling may be necessary to ensure that the waste is properly designated as it is prepared for disposal. The in-process sampling guidelines will be included in the routine work procedures for waste management and packaging.

Field screening and/or sampling will be conducted, but are not limited to, the following specific area of concern:

- **Floor drains**: The initial characterization sample results showed that radiological contamination was present. Field screening followed by sampling will be conducted to verify that cleanup limits are met.

4.3.3 Final Status Characterization

A final status characterization will be performed to determine the final condition of the facilities/sites after D&D activities are complete. This sampling and analysis effort will provide data to demonstrate that all residual radioactivity and hazardous or toxic materials meet the site cleanup criteria. A higher degree of assurance is needed when showing that the cleanup criteria have been met. The final status sampling and analysis plan will be developed based on the final release criteria; guidelines for conducting remediation control surveys; in accordance with DOE Order 5400.5 (DOE 1993); characterization for material disposition guidelines described in the *Decommissioning Handbook* (DOE 1994); and the data quality objective process.

Although the final status characterization plan is discussed as if it were an activity performed at a single specified stage of the decommissioning process, this may not be the case. Data from sampling efforts conducted at other stages of the decommissioning, such as initial characterization, may be incorporated into the final status characterization when appropriate. The verification sampling analysis plan will be submitted to Ecology for approval.

4.4 NATURAL AND CULTURAL RESOURCES PROTECTION

The area along the Columbia River contains many cultural resources, including prehistoric and historic sites, Native American artifacts, and sites of religious significance. Archaeological sites and traditional-use areas have been located adjacent to the 100-N Area. Within the fence line around 100-N Area, however, the likelihood of archaeological remains is remote because of the extensive disturbance resulting from construction of the 100-N Reactor.

The 100-N Complex itself is also considered a historic resource. DOE, the Washington State Historic Preservation Office, and the Advisory Council on Historic Preservation concurred that the Hanford Site Manhattan Project and Cold War Era Historic District is eligible for listing in the National Register of Historic Places and agreed to a sitewide treatment plan adopted under a programmatic agreement. Federal regulation requires the completion of the mitigation process prior to any proposed federal undertaking (e.g., the demolition of buildings) that would adversely impact historic properties. Several buildings at the 100-N Complex were identified in the programmatic agreement as contributing properties to the Hanford Site Manhattan Project and Cold War Era Historic District. Mitigation requirements for these buildings will be met by preparing the appropriate historic property inventory forms and other necessary documentation.

Threatened and endangered flora/fauna species are known to exist in the 100 Areas, but no adverse impacts on protected species or critical habitat is anticipated from activities associated with the removal action. Nevertheless, an ecological review will be conducted prior to demolition to identify any potential impacts. If potential impacts are discovered, an appropriate mitigation plan will be developed and implemented. In the event that the river structures, 1908-NE Outfall Structure and the 181-NE River Pump House, require removal, a thorough study will be performed to identify mitigation measures for implementation to protect endangered fish species. Because of the extensive disturbance from construction of these facilities, no adverse impact on local habitat, animal species, or Native American concerns is anticipated. It is also unlikely that any human remains will be discovered because of previous major disturbance to the affected area from the construction activity.

5.0 PROJECT MANAGEMENT AND ORGANIZATION

5.1 PROJECT SCHEDULE AND COST ESTIMATE

The schedule, which encompasses the work scope of the HGP ancillary facilities, is included in Appendix A.

5.2 CHANGE MANAGEMENT / CONFIGURATION CONTROL

If a change arises that results in a fundamental change to the selected response action that is not within the scope of the action memorandum (Ecology et al. 1999) and the implementing documents, then an EE/CA or proposed plan and supporting documentation will be prepared to allow DOE and Ecology to select a revised response action.

5.3 PERSONNEL TRAINING AND QUALIFICATIONS

During the performance of project activities, the experience and capabilities of the operating staff are 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 vital to 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.

Health physics workers are 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.

5.4 PROJECT CLOSEOUT

Removal of the facilities and their systems will be completed to a minimum depth of 0.305 m below-grade. At this excavation level, additional characterization will be conducted to verify the status of the remaining below-grade structure. If the remaining below-grade structure is found to exceed cleanup standards, then excavation will continue to a maximum depth of 4.6 m below grade. If groundwater protection standards are not met at the 4.6-m depth, then any additional remediation will be performed. Soil excavated as a result of the removal of below-grade structures will be designated and disposed of, as appropriate.

Upon completion of D&D activities, a minimum of 0.305 m clean fill/soil cover will be placed over any remaining below-grade structure and inert/demolition material, and will be graded to match the surrounding terrain.

The ARARs for project activities identified in the action memorandum (Ecology et. al 1999) establish the cleanup criteria for the 100-N site. Cleanup levels specified for soils, below-grade structures, and fill materials will meet the MTCA Method B standard for nonradiological contaminants in soils. For radionuclides, the EPA protectiveness factor of 15 mrem/yr effective dose equivalent to 4.6 m below grade will apply. In addition, these cleanup levels will ensure that MCLs and the EPA 4 mrem/yr protectiveness factor for groundwater will not be exceeded. Rubble created from the demolition of the structure will be evaluated against dangerous waste criteria, ERDF waste acceptance criteria (BHI 1996), and radiological standards. Materials that exceed dangerous waste criteria radiological standards will be appropriately segregated and disposed in accordance with Section 4.2. Subsurface structures and debris that meet the MTCA and radiological standards may be left in place.

After completion of all demolition activities, a cleanup verification report will be prepared. The report will be forwarded to the records retention center where it will be included with the administrative record for the 100-N operable unit. In accordance with the action memorandum (Ecology et al. 1999), the verification report will be submitted to Ecology for review and approval.

6.0 REFERENCES

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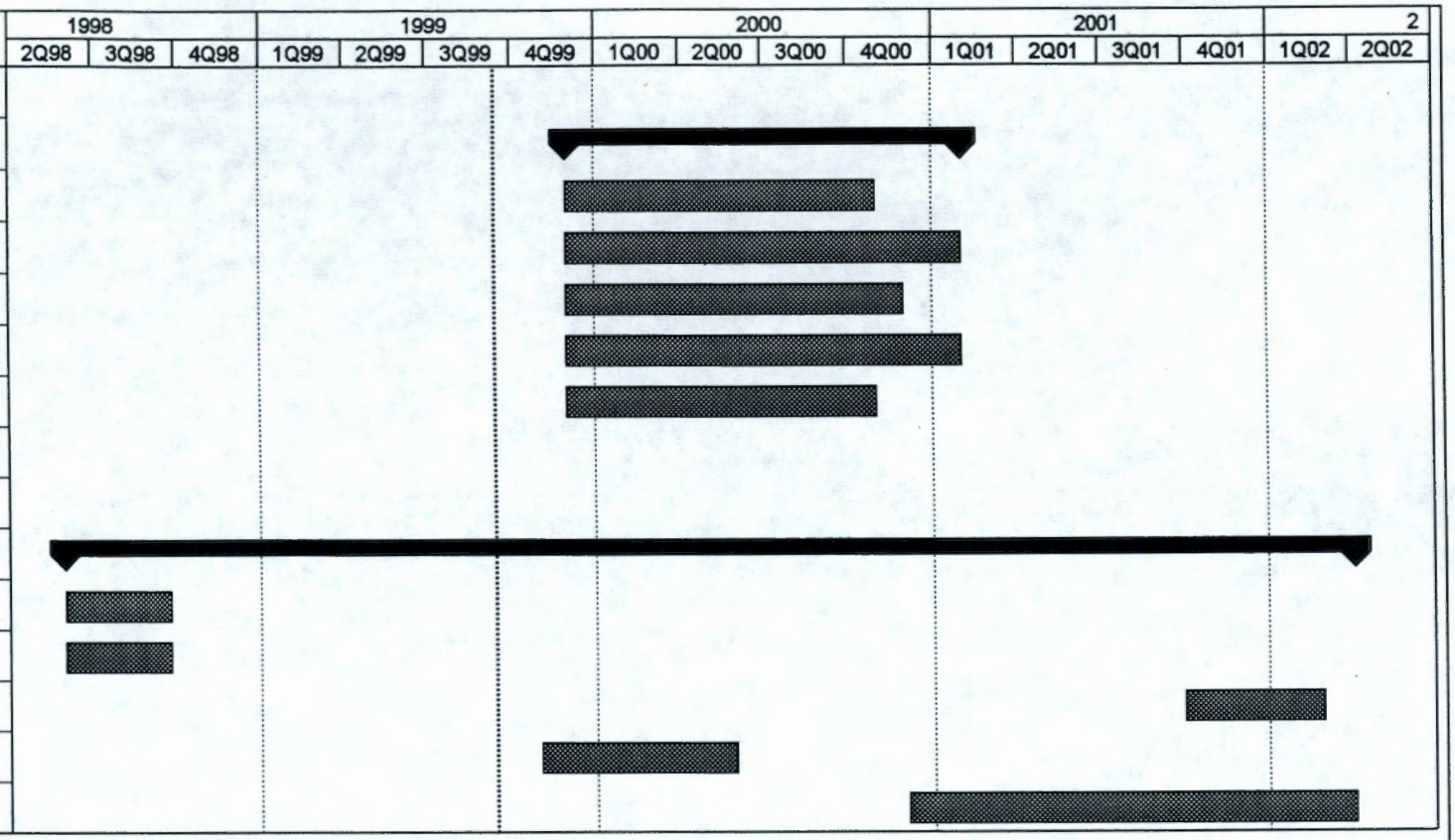
WHC, 1993, Engineering Report of the Hanford Generating Plant Radiation Contamination Survey, WHC-SD-NR-ER-100, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

HGP PROJECT SCHEDULE

ID	Task Name
1	
2	**ENVIRONMENTAL CLEANUP**
3	SWMU #2- Oil Storage Area
4	SWMU #3- Floor Drains
5	SWMU #4- Oil Filter Areas
6	SWMU #7- Outfall
7	SWMU #8- 1716 Floor Drains
8	
9	
10	**BUILDING REMOVALS**
11	1701-NE Gate House
12	1703-N Office Building
13	1716-NE Maintenance Garage
14	1802-N Trestle Removal
15	185-N Turbine Generator Bldg



Project: HGP RAW Schedule
Date: Mon 9/13/99

Task		Summary		Rolled Up Progress	
Split		Rolled Up Task		External Tasks	
Progress		Rolled Up Split		Project Summary	
Milestone		Rolled Up Milestone			

APPENDIX B

AIR MONITORING PLAN FOR HGP D&D ACTIVITIES

1.0 INTRODUCTION

Pre-demolition and demolition work, which have the potential to emit radioactive emissions, are part of the D&D activities for the Hanford Generating Plant (HGP). This removal action is a CERCLA program activity (Ecology, EPA, and DOE, 1998). Quantification of radioactive air emissions implementing the best available radionuclide control technology (BARCT) and air monitoring has been identified as substantive requirements (i.e., a relevant and appropriate requirement). A BARCT compliance demonstration is determined by the regulatory agency on a case-by-case basis. These substantive requirements are according to WAC 246-247. This plan presents compliance with those requirements.

1.1 PLANNED ACTIVITIES

The radioactive materials within the HGP will be potentially released during both pre-demolition and demolition activities.

Pre-demolition activities include decontamination of concrete, metal, wood, and glass by either: 1) fixing contamination to material using paint or other fixative; 2) wrapping material with plastic for disposal; 3) removing contamination using soap, water and rags; or 4) removing contamination with "dustless" decontamination tools (scrabble guns) with HEPA-filtered exhaust.

Demolition activities will occur after the pre-demolition activities are completed. Demolition methods will be selected based on the structural elements to be demolished, remaining radionuclide contamination, location, and integrity of the facility. Demolition methods could include use of an excavator with a hoe-ram, a hydraulic shear with steel shear jaws, concrete pulverizer / breaker jaws, crane with wrecking ball, cutters, or mechanical/power saws.

2.0 AIRBORNE SOURCE INFORMATION

There is a potential for particulate radioactive airborne emissions resulting from D&D activities. Calculation 0100N-CA-V0018 (BHI 1999b) is the basis for the calculated total unabated offsite dose. The radionuclide inventory was obtained from the *Source Term for Effluent Dose* document (FWEC 1999), which was specifically generated for calculating the gross amount of radioactivity within the HGP. The *Source Term for Effluent Dose* document (FWEC 1999) quantifies the amount of activity per specific radionuclides and their specific locations. Locations in which contamination was found within the HGP are listed below:

- Piping
- Valves
- Receiver (Blowdown Tank)
- Mixing Header

- Turbine Inner Walls
- Turbine Buckets and Diaphragms
- Condenser Vault / Tubing
- Daerator Heater / Storage Tank
- Condensate Polishing Unit (Powdex)
- Low Pressure Heater

The *Source Term for Effluent Dose* document (FWEC 1999) discusses the above-mentioned items in more detail. Radiological inventory data summarized in the source term document (FWEC 1999) was acquired from the following documents:

- BHI, 1996a, *Characterization Plan for the Hanford Generating Plant*, BHI-00936, Rev. 0, Bechtel Hanford Inc., Richland Washington.

- WHC, 1993, *Engineering Report of the Hanford Generating Plant Radiation Contamination Survey*, WHC-SD-NR-ER-100, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

- Raytheon Corp., *HGP Demolition Study*, October 1996, Richland, Washington.

2.1 FACILITY INVENTORY

The referenced documents above describe the sampling and analysis campaigns that were performed by WHC and BHI. Plant history and process knowledge indicate that the facility was operated in a very clean manner. No known uncontrolled spills of contamination are known to have ever occurred. Maintenance was always performed within negative pressure containment structures. Therefore, the exterior surface areas of the systems and equipment found within the plant are clean. This was confirmed by WHC and BHI, and then recently confirmed by an Energy Northwest independent contractor.

The interior of the HGP pipes; vessels and equipment that came in contact with N-Reactor steam may be contaminated. The entire system was flushed prior to deactivation, so only low levels of contamination were expected.

The entire gross inventory within the HGP, not considering the form, location, dispersability and ability to be released, was considered eligible for release. The Annual Possession Quantity was obtained by taking the total gross inventory in the HGP and dividing it by the duration of the activity (2 years). The radionuclide annual possession quantities for the major isotopes and potential radionuclide air emissions are presented in Table B-1. Isotopes other than those presented in Table B-1 may be encountered during pre-demolition activities. However, it is expected that the isotopic concentrations listed in the table represent the upper bounds of what will actually be found during the D&D activities, and the estimates presented here are conservative.

The assumptions and details of Table B-1 are documented in the supporting calculation (BHI 1999b). If the results from D&D activities are found to be greater than the bounding limits presented in this plan, the information will be documented and the lead regulatory agency

(Washington State Department of Ecology), and the Washington State Department of Health will be notified.

The CAP-88 model was used to determine the annual unabated offsite dose presented in Table B-1. The potential-to-emit (Ci/yr) was the input for the model, and the model generated the annual unabated offsite dose. The distance to the maximally exposed individual used in the model was 18,095 m to the east. The CAP model summary and synopsis are presented in BHI (1999b).

The total unabated offsite dose from the pre-demolition and demolition activities is 1.58 E-04 mrem/yr.

Table B-1. HGP Potential-to-Emit Values

Radionuclide	Annual Possession Quantity (Total Ci/yr)	Release Fraction	Potential to Emit (Ci/yr)	Unabated Dose Rate (mrem/yr)[2]
Co-60	4.89E-03	Note 1	1.23E-03	1.52E-04
Cs-137	5.85E-04	Note 1	1.47E-04	4.34E-06
Ba-137m	5.55E-04	Note 1	1.39E-04	2.58E-16
Sr-90	1.00E-04	Note 1	2.51E-05	2.09E-06
Y-90	1.00E-04	Note 1	2.51E-05	4.50E-09
Total				**1.58E-04**

Notes:

[1]There are two release fractions used in this calculation. A release fraction of 1.0 is used for all activities using a HEPA vacuum (referenced from Department of Health letter AIR-94-802) or aggressive decontamination. A release fraction of 1x 10^{-3} is used for all other activities as referenced in WAC-246-247. The HGP D&D project is planning on the use of aggressive decontamination techniques less that 25% of the time but for the purposes of this plan, 75% of the activities were considered nonaggressive and 25% of the activities were considered aggressive (BHI 1999b).

[2]Radionuclide annual possession quantities are as presented in BHI 1999b. The annual unabated dose was determined using the CAP-88 model. The potential-to-emit (Ci/yr.) was the input to the model, and the model generated the annual unabated dose rate. The distance to maximally exposed individual is 18,095 m to the east. The CAP-88 model summary and synopsis is presented in BHI (1999b).

3.0 BEST AVAILABLE RADIONUCLIDE CONTROL TECHNOLOGY

The following are the BARCTs to be implemented during D&D activities at the HGP.

3.1 EMISSION CONTROLS

Pre-demolition activities will consist of nonaggressive methods such as wiping a surface, applying foam polymers or fixatives. Aggressive methods consist of scabbling, abrasive blasting and vacuuming.

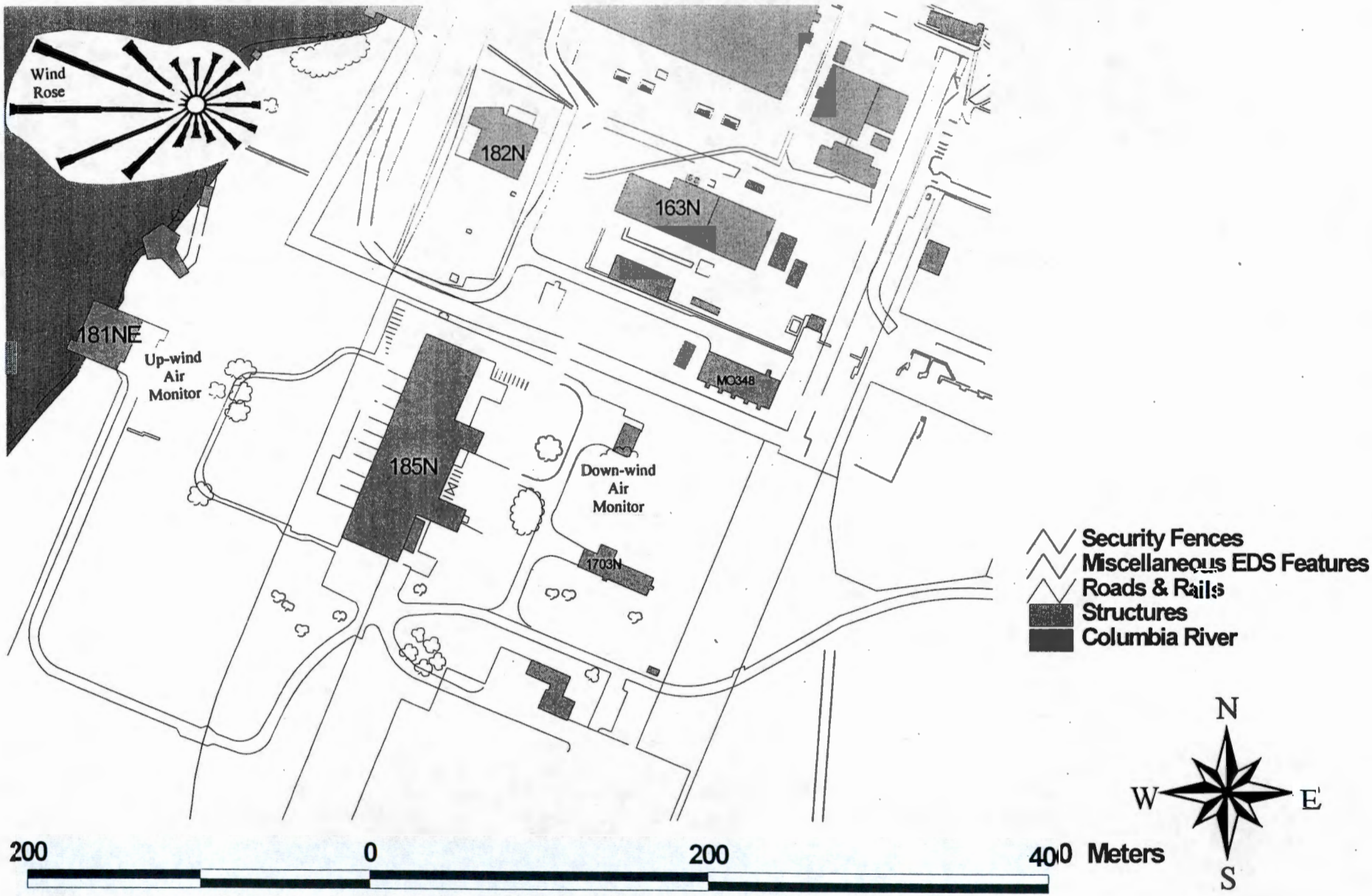
For the aggressive methods, the equipment used will contain HEPA-filtered units. By connecting the HEPA-filtered unit to the tools, the dust and debris can be collected into containers as it is generated. For nonaggressive decontamination, the use of wiping, applying foam polymers or applying fixatives is an ALARA control that has been accepted as BARCT for fugitive particulate radionuclide air emissions, particularly when the potential offsite dose is low. Because structural demolition may be a source of radioactive fugitive emissions, dust suppressants (e.g., water, fixatives) will be used and are considered BARCT for demolition. Additionally, for the aggressive techniques, the use of HEPA filters has been generally accepted as BARCT. The HGP D&D project is planning on the use of aggressive decontamination techniques less than 25% of the time but for the purposes of this plan, 75% of the activities were considered nonaggressive and 25% of the activities were considered aggressive.

4.0 MONITORING

The potential dose from D&D activities is less than 0.1 mrem/yr; therefore, this air emission source is not subject to the radionuclide National Emission Standards for Hazardous Air Pollutants (NESHAPs) for continuous monitoring systems. However, periodic confirmatory measurements will take place throughout the duration of the project.

Monitoring activities will consist of using near-field air monitoring stations in the 100-N Area near the HGP. Two air-monitoring stations (one upwind and one downwind) will be located in the 100-N Area, as shown in Figure B-1. The near-field air monitors are the means/methods to verify low emissions. The operation of these monitors will follow the protocol established for near-field monitors. The data from these monitors will be entered into the ABCASH (automated bar coding of air samples at Hanford) database for record keeping and reporting. The data will be summarized in the annual reports prepared for the Hanford Site.

185N


Wind Rose
182N
163N
181NE
Up-wind Air Monitor
MO348
185N
Down-wind Air Monitor
1703N
Security Fences
Miscellaneous EDS Features
Roads & Rails
Structures
Columbia River
N
W
E
S
200
0
200
400 Meters