0071837

DOE/RL-2005-33
Rev. 1

100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan

United States
Department of Energy

DOCUMENT CONTROL 11/27/06 DRD

DOE/RL-2005-33
Rev. 1
OU: N/A
TSD: N/A
ERA: N/A

STANDARD APPROVAL PAGE

Title: 100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan

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100-K Area Interim Safe Storage and D4 Project Waste Sampling and Analysis Plan

Date Published
November 2006

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

EXECUTIVE SUMMARY

This sampling and analysis plan (SAP) presents the strategy, requirements, and procedures for sampling and analysis activities that support waste management decisions associated with interim safe storage (ISS) of the 100-K Area reactors and deactivation, decontamination, decommissioning, and demolition (D4) of associated 100-K Area facilities. This revision (Revision 1) covers all of the 100-K Area facilities including the reactors, whereas the original version (Revision 0) covered only 27 facilities.

The goal of this SAP is to dispose of the demolition waste generated in a safe, appropriate, and cost-effective manner. This SAP uses the extensive knowledge gained from previous ISS and D4 activities conducted at five similar single-pass Hanford Site reactors (105-C, 105-D, 105-DR, 105-F, and 105-H). A summary of waste streams expected, a list of contaminants of concern, and the analytical requirements for each contaminant of concern are presented.

This SAP presents a characterization strategy that will be implemented for each facility. The characterization strategy will include historical research, radiological and industrial hygiene scoping surveys (as needed), facility inspections, and sampling/analyses (as needed) to support disposal of waste. Focused (biased) sampling in high contamination areas where highest hold-up would be found will be used to provide worst-case media contaminant concentrations to support waste management decisions.

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ACRONYMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
COC	contaminant of concern
CSS	characterization scoping survey
D4	deactivation, decontamination, decommissioning, and demolition
DOE	U.S. Department of Energy
DQO	data quality objective
DS	decision statement
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
FSP	field sampling plan
IH	industrial hygiene
ISS	interim safe storage
OU	operable unit
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control
RAWP	removal action work plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RWP	radiological work permit
SAF	sample authorization form
SAP	sampling and analysis plan
SFL	standard fixed laboratory
SME	subject matter expert
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and disposal
WAC	*Washington Administrative Code*

Acronyms

1.0 INTRODUCTION

This sampling and analysis plan (SAP) presents the rationale and strategy for the facility-specific waste characterization activities to support interim safe storage (ISS) of the 100-K Area reactors and deactivation, decontamination, decommissioning, and demolition (D4) of associated 100-K Area facilities. The goal of this SAP is to support characterization of the demolition waste generated in a safe, appropriate, and cost-effective manner.

The regulatory framework, requirements, and integration of other closure actions at the 100-K Area (groundwater cleanup activities, K-Basins, *Resource Conservation and Recovery Act of 1976* [RCRA] closures, etc.) are described in the engineering evaluation/cost analysis (EE/CA). The *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities* (DOE-RL 2004) describes 27 ancillary facilities at the 100-K Area and the *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities* (DOE-RL 2006) describes the remaining facilities in the 100-K Area, including the reactors.

The activities for the 27 ancillary facilities at the 100-K Area are being conducted in accordance with the *Removal Action Work Plan for 100-K Area Ancillary Facilities* (100-K Area RAWP) (DOE-RL 2005). The RAWP is currently being revised to include the remaining facilities in the 100-K Area, including the reactors.

Future action memorandums may provide additional guidance and objectives for the management of wastes generated.

1.1 PROJECT SCOPE

The 100-K Area facilities and structures included in the scope of this SAP are described in the applicable EE/CA (DOE-RL 2004 and DOE-RL 2006). The buildings addressed are provided in Tables 1-1 through 1-6. The various facilities have been grouped in the tables by related activities or similar operations. Descriptions of the buildings are provided in Appendix A.

This SAP uses the extensive knowledge gained from previous ISS and D4 activities conducted at five similar single-pass Hanford Site reactors (105-C, 105-D, 105-DR, 105-F, and 105-H). The objectives and requirements for this SAP are based on the data quality objectives (DQOs) described in the *DQO Summary Report for 105-KE and 105-KW Reactors and Ancillary Facilities Interim Safe Storage and D4 Project Waste Characterization* (WCH 2006).

Table 1-1. Buildings Related to Reactors. (2 Pages)

Building Number	Building Name
105-KE	Reactor Building
105-KW	Reactor Building

Table 1-1. Buildings Related to Reactors. (2 Pages)

Building Number	Building Name
115-KE	Gas Recirculation Facility
115-KW	Gas Recirculation Facility
116-KE	Reactor Exhaust Stack
116-KW	Reactor Exhaust Stack
117-KE	Exhaust Air Filter Building
117-KW	Exhaust Air Filter Building
118-KE2	Horizontal Control Rod Storage Cave
118-KW2	Horizontal Control Rod Storage Cave
119-KE	Exhaust Air Sample Building
119-KW	Exhaust Air Sample Building
1908-KE	Effluent Water Monitoring Station

Table 1-2. Buildings Related to Clean Water Activities. (2 Pages)

Building Number	Building Name
105-KW 167-K/167-KE	Water Tunnels Crosstie Tunnel Building
181-KE	River Pump House
181-KW	River Pump House
182-K	Emergency Water Reservoir Pump House
183.1-KE	Headhouse
183.1-KW	Headhouse
183.2-KE	Basins/Sedimentation
183.2-KW	Basins/Sedimentation
1908-KE	Effluent Water Monitoring Station
105-KE	Water Tunnels
105-KW	Water Tunnels
183.3-KE	Basin/Filters
183.3-KW	Basin/Filters
183.4-KE	Reservoir and Clearwells
183.4-KW	Reservoir and Clearwells
183.5-KE	Lime Feeder Building
183.5-KW	Lime Feeder Building

Table 1-2. Buildings Related to Clean Water Activities. (2 Pages)

Building Number	Building Name
183.6-KE	Lime Feeder Building
183.6-KW	Lime Feeder Building
183.7-KE	Pipe Tunnel
183.7-KW	Pipe Tunnel
183-KE	Chlorine Vault
183-KW	Chlorine Vault
185-K	Potable Water Treatment Plant
190-KE	Main Pump House
190-KW	Process Water Pump House

Table 1-3. Buildings Related to Reactor Fuel Storage Activities.

Building Number	Building Name
105-KE FSB	Fuel Storage Basin
105-KW FSB	Fuel Storage Basin
142-K	Cold Vacuum Drying Facility
142-KA	Cold Vacuum Drying Facility Generator Building
296-K105	Air Sparging Vent 105-KW Basin
296-K142	Cold Vacuum Drying Facility Main Stack

Table 1-4. Buildings Related to Administration and Support Activities. (3 Pages)

Building Number	Building Name
1506-K1	Fiber Optics Computer Hut
1605-K	Guard Towers and Fences, to include poles, lines, and above-grade utility piping
1614-K	Environmental Monitoring Station
1701-K	Abandoned Guardhouse (at southwest corner of 1720-K)
1713-KE	Shop Building
1713-KER	Warehouse
1713-KW	Warehouse
1714-KE	Oil and Paint Storage Shed
1714-KW	Warehouse

Table 1-4. Buildings Related to Administration and Support Activities. (3 Pages)

Building Number	Building Name
1717-AKE	Fan House
1717-K	Maintenance/Transportation Shop
1720-K	Administrative Office Building
1724-K	Maintenance Shop
1724-KA	Equipment Shed
1724-KB	Gas Bottle Storage Building
CC1K0035	Cargo Container N of 105-KW
CC1K0036	Cargo Container N of 105-KE
CC1K0037	Cargo Container N of 1714-KE
CC1K0176	Cargo Container E of 115-KE
CC1K0177	Cargo Container E of 115-KE
CC1K0178	Cargo Container E of 115-KE
CC1K0179	Cargo Container E of 115-KE
CC1K0180	Cargo Container E of 115-KE
CC1K0181	Cargo Container E of 115-KE
CC1K0182	Cargo Container E of 115-KE
CC1K0236	Cargo Container NE of 142-K
HS0028	Storage Container at KA-CW-1 N of 166-KE
HS0080	Storage Container
HS0081	Storage Container
KA-CW-01	CERCLA Storage Unit
MO-048	Mobile Office - N of 165-KE (1733-KE)
MO-054	Mobile Office - S of MO500 (1734-K)
MO-060	Training Mobile Office - E of MO969
MO-101	Mobile Office at 1717-K (1711-K)
MO-102	Mobile Office at 1717-K (1709-K)
MO-214	Mobile Office - Patrol Badgehouse (1701-K)
MO-236	Mobile Office - S of 115-KW (1728-KW)
MO-237	Mobile Office - S of 115-KW (1729-KW)
MO-293	Mobile Office - E of 183-KE (1725-K)
MO-323	CVDF Change Trailer

Table 1-4. Buildings Related to Administration and Support Activities. (3 Pages)

Building Number	Building Name
MO-382	MO abandoned 1720-K
MO-401	Mobile Office - At 1724-K (1719-K)
MO-402	Mobile Office - (1718-K)
MO-442	Mobile Office - at 183, 1-KE (1726-K)
MO-495	Mobile Office - SW of 142 (CVDF)
MO-500	Mobile Office - S of 1724-K (1737-K)
MO-506	Mobile Office - S of CVDF
MO-507	Mobile Office -S of 142-K CVDF
MO-907	Mobile Office - at CVDF
MO-917	Mobile Office -at CVDF
MO-928	Mobile Office - at 1717-K (1723-K)
MO-955	Mobile Office - S of 115-KW (1732-KW)
MO-969	Mobile Office - N of 165-KE (1730E)

Table 1-5. Buildings Related to Electrical Operations.

Building Number	Building Name
151-K	Switching Station
151-KE	Substation 230-KV
151-KW	Substation 230-KV

Table 1-6. Buildings Related to Special Activities. (2 Pages)

Building Number	Building Name
110-KE	Gas Storage Facility
110-KW	Gas Storage Facility
165-KE	Power Control Building
165-KW	Power Control Building
1604-K	Process Building KR4
1606-K	Transfer Building KR-3
1607-K	Transfer Building 1
166A-KE	Oil Storage Facility Valvehouse

Table 1-6. Buildings Related to Special Activities. (2 Pages)

Building Number	Building Name
166A-KW	Oil Storage Facility Valvehouse
166-KE	Oil Storage Vault
166-KW	Oil Storage Vault
1705-KE	Effluent Water Treatment Pilot Plant
1706-KE	Water Studies Semi-Works Building
1706-KEL	Development Laboratory
1706-KER	Water Studies Recirculation Building

1.2 PROJECT OBJECTIVE

This SAP describes a characterization strategy to provide the necessary information to support waste characterization activities. Historical information and facility walkdowns will be combined with radiological surveys of each facility to determine if additional sampling is needed. If needed, samples of specific waste media will be collected from biased worst-case locations and used to establish the bounding contaminant concentrations in the media.

1.3 BACKGROUND

The Hanford Site is a 1,517-km^2 (586-mi^2) federal facility located in southeastern Washington State along the Columbia River (Figure 1-1) and operated by the U.S. Department of Energy (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 now-retired nuclear reactors and associated support facilities that were constructed and operated to produce weapons-grade plutonium.

The 100-K Area contains the 105-K East (KE) and 105-K West (KW) Reactor buildings and supporting facilities. Figure 1-2 shows the initial 27 ancillary facilities and Figure 1-3 shows the additional facilities covered by this revision. Figure 1-4 is a recent aerial photograph of the 100-K Area. Appendix A provides a description of the buildings and structures included in the scope of this SAP.

The 100-K Area is subdivided into three operable units (OUs) to address cleanup of the soil and groundwater contamination that resulted from past operations. The 100-KR-1 and 100-KR-2 OUs encompass liquid waste disposal sites, burial grounds, and soil waste sites. The 100-KR-4 OU includes the groundwater contamination underlying the 100-K Area. Geographically, the facilities addressed in this SAP are co-located within the 100-KR-1 and 100-KR-2 OU waste sites. The scope and role of other *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) cleanup actions in the 100-K Area and their relationship to this removal action are outside the scope of this SAP.

Figure 1-1. Hanford Site Map.

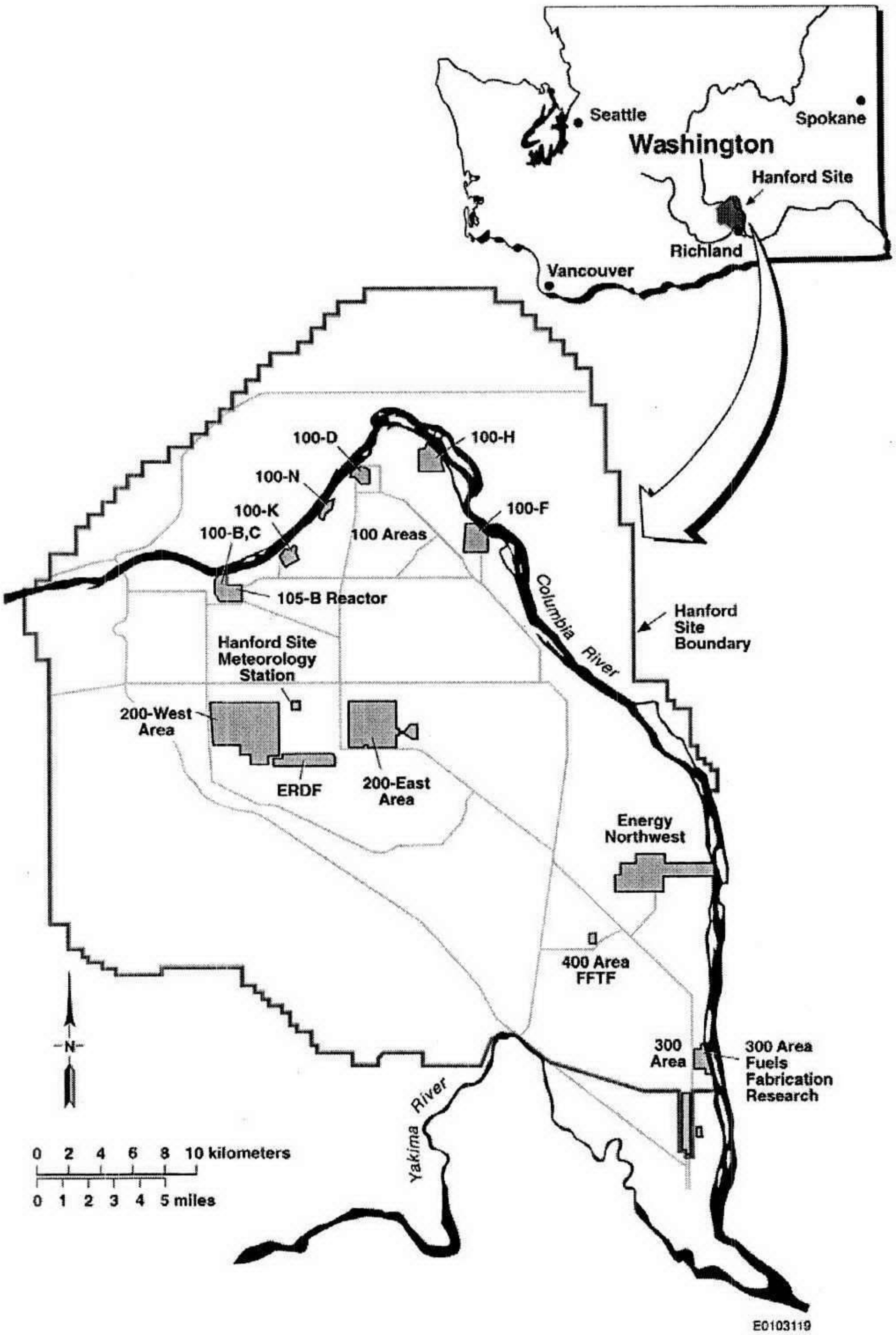


Figure 1-2. Map of the 100-K Area (Initial 27 Ancillary Facilities).

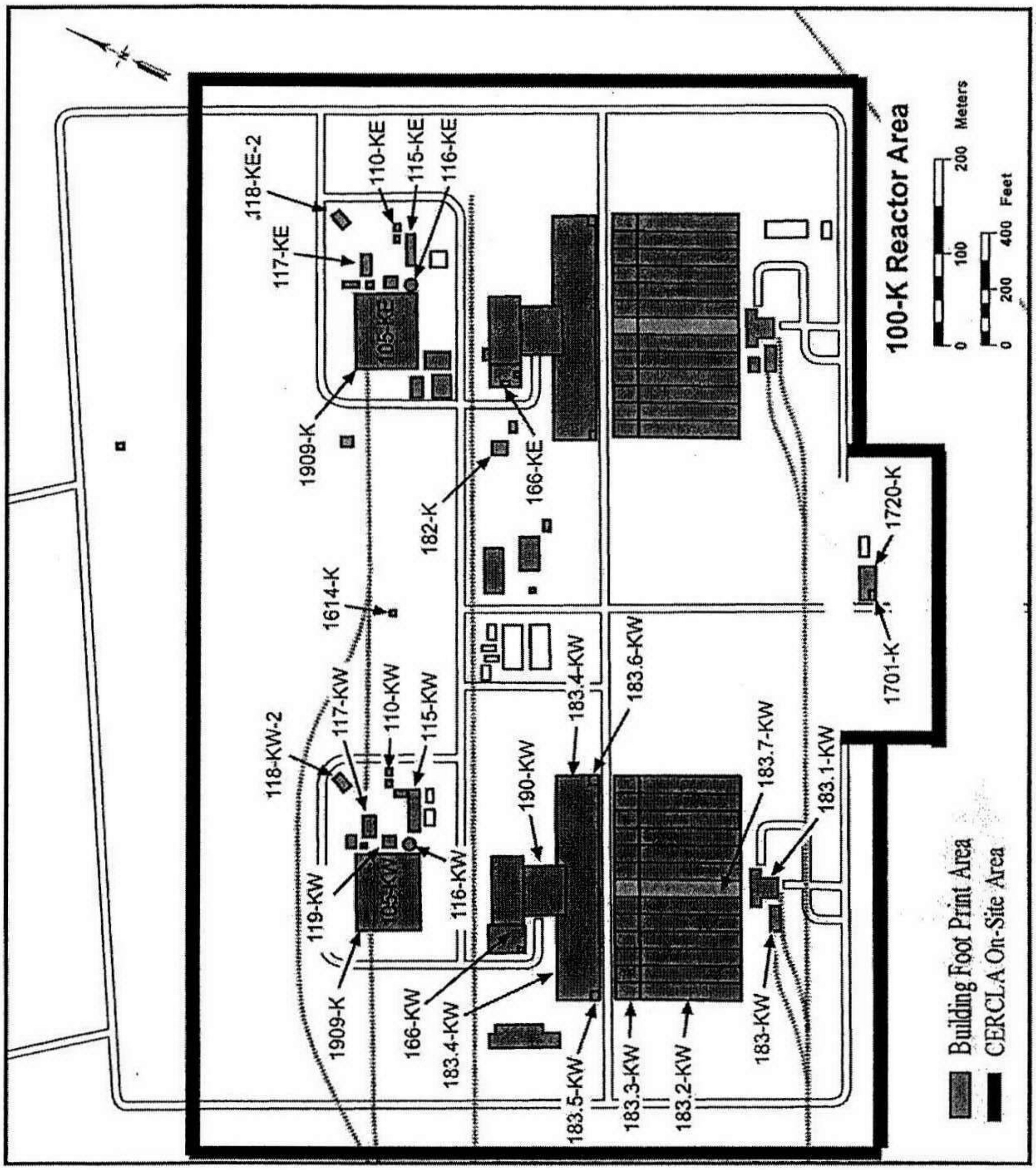


Figure 1-4. Aerial Photograph of the 100-K Area. (The 100-KE facilities are in the foreground.)

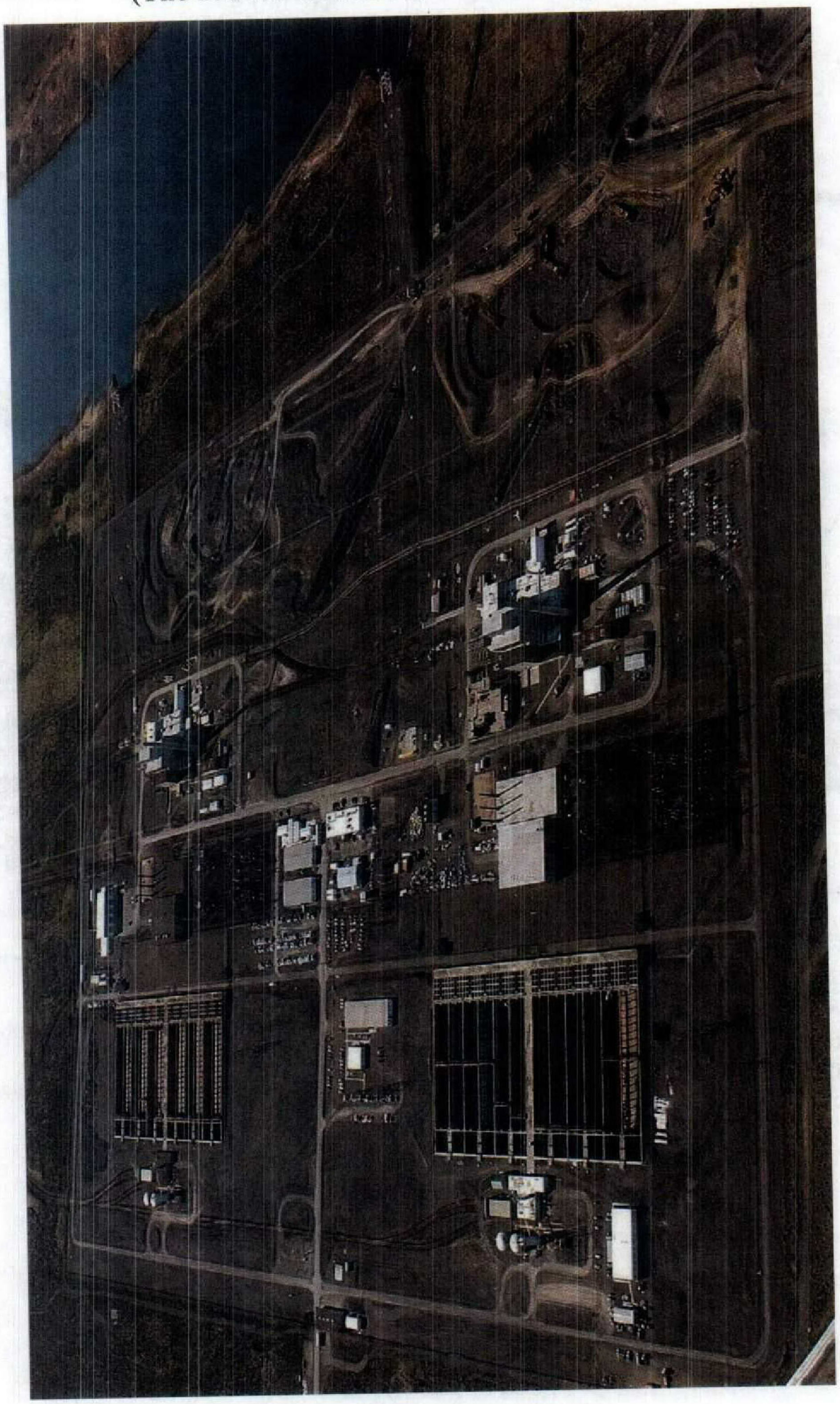
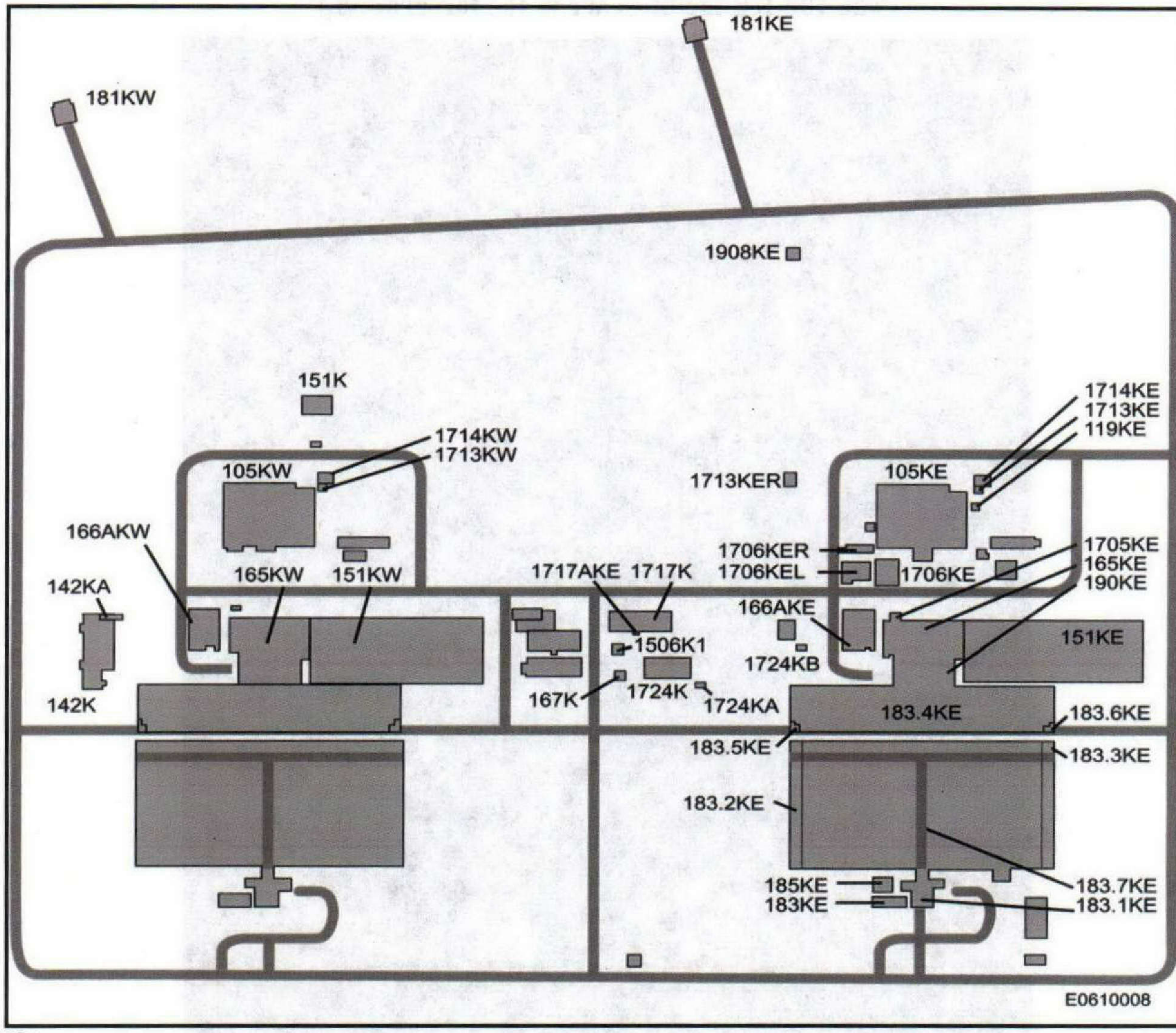


Figure 1-3. Map of the 100-K Area (Reactor and Additional Ancillary Facilities).



Notes:

- Shaded areas show "Building Footprint Areas."
- The entire 100-K Area is the "CERCLA On-Site Area," in addition to the outlying pump-and-treat buildings (1604-K, 1606-K, and 1607-K) which are not shown above.
- Some miscellaneous items are not identified by number on the map (e.g., stacks, cargo/storage containers and units, mobile office trailers, pipe and water tunnels, and guard towers and fences).

1.3.1 Site Status

Past operations, disposal practices, spills, and unplanned releases have resulted in contaminated facility structures, underlying soil, and groundwater in the 100-K Area. Consequently, in November 1989, the 100 Area (including the 100-K Area) was one of four areas of the Hanford Site that was placed on the U.S. Environmental Protection Agency's (EPA's) National Priorities List under CERCLA, as amended by the *Superfund Amendments and Reauthorization Act of 1986*.

The 1706-KE Building has a small area that is called the "1706-KE Waste Treatment System," which is regulated as a treatment, storage, and disposal (TSD) unit under the RCRA. The DOE, EPA, and Washington State Department of Ecology (Tri-Parties) have agreed to integrate the cleanup and closure of this TSD unit with the CERCLA process (DOE-RL 2004, 2006).

1.3.2 Facility Description

Facility descriptions, process histories, and construction histories are summarized in Appendix A, which were adapted from the applicable EE/CA (DOE-RL 2004, 2006).

1.3.3 Contaminants of Concern

Table 1-7 shows the 100-K Area contaminants of concern (COCs) that were developed during the DQO process (WCH 2006). Facility-specific COC and the final characterization approach will be assigned after implementation of the activities described in Section 3.0 of this SAP.

1.3.4 Conceptual Waste Stream Models

Common waste streams are consistently encountered during ISS and D4 activities. Table 1-8 provides generalized conceptual waste stream models that have been developed to provide a basis for categorizing types of waste that will be generated during ISS and D4 activities. Final COC and characterization approach will be assigned to each waste stream and evaluated during implementation of the activities described in Section 3.0 of this SAP.

1.4 DATA QUALITY OBJECTIVES

The *Guidance for Data Quality Objectives Process* (EPA 2000) was used to support the development of this SAP. The objectives and requirements for this SAP are based on the DQOs described in the *DQO Summary Report for 105-KE and 105-KW Reactors and Ancillary Facilities Interim Safe Storage and D4 Project Waste Characterization* (WCH 2006).

Table 1-7. Final Contaminants of Concern List.

Radioactive COC			
Americium-241 Americium-242m Americium-243 Antimony-125 Cadmium-113m Carbon-14 Cesium-134 Cesium-135 Cesium-137 Cobalt-60 Curium-243 Curium-244	Europium-152 Europium-154 Europium-155 Iodine-129 Iron-55 Lead-210 Neptunium-237 Nickel-59 Nickel-63 Niobium-93m Niobium-94 Palladium-107	Plutonium-236 Plutonium-238 Plutonium-239/240 Plutonium-241 Plutonium-242 Promethium-147 Radium-226 Radium-228 Rhodium-102 Samarium-151 Selenium-79	Strontium-90 Technetium-99 Thorium-232 Tin-121m Tin-126 Tritium Uranium-234 Uranium-235 Uranium-236 Uranium-238 Zirconium-93
Inorganic Chemical COC			
Aluminum[a] Aluminum sulfate[a] Ammonia[a] Ammonium hydroxide[a] Ammonium[a] Antimony[a] Arsenic Asbestos Barium Beryllium[a] Boric acid[a] Bromide[a]	Cadmium Calcium[a] Chloride[a] Chromium Cyanide[a] Fluoride[a] Hydrochloric acid[a] Iron[a] Lead Magnesium[a] Manganese[a] Mercury	Nickel[a] Nitrate[a] Nitrite[a] Nitric acid[a] Phosphate[a] Phosphoric acid[a] Potassium chloride[a] Potassium dichromate[a] Potassium iodide[a] Potassium permanganate[a] Potassium phosphate[a] Selenium	Silicon[a] Silver Sodium dichromate[a] Sodium chloride[a] Sodium hydroxide[a] Sodium metabisulfite[a] Sodium phosphate[a] Sodium thiosulfate[a] Sulfate[a] Sulfide[a] Sulfuric acid[a] Vanadium[a] Zinc[a]
Organic Chemical COC			
1,1,2-trichloro-1,1,2-trifluoroethane Benzene Creosote Ethyl benzene	Ethylene glycol Freon Herbicides Grease Oil	PAH Paint thinner PCBs Perchloroethylene Pesticides	Tar Toluene Trichloroethene Xylene
Waste Characteristic COC			
Conductivity/pH Corrosivity Gross alpha activity	Gross beta activity Ignitability Semivolatile organic compounds	Total dissolved solids Total organic carbon[a]	Total organic halogens[a] Total suspended solids[a] Volatile organic compounds

[a] Solids excluded; concern is for liquids disposed at the Effluent Treatment Facility only.
COC = contaminant of concern
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl

Table 1-8. Routine Waste Streams and Source of Contamination at 100-K Area. (2 Pages)

WS #	Waste Stream (Affected Media)	Known or Suspected Source of Contamination
1	**Demolition debris:** Concrete, concrete block, steel, structural steel, plant process equipment, tanks, drain lines, electrical control panel, sheetrock, piping, tools, miscellaneous hardware, wire, nonasbestos-containing structural materials, Kraft paper, personal protective equipment, rags, and wood	Interior and exterior protective coatings
		Potential airborne and/or waterborne radioactive and chemical contamination from past operations
2	**Machine shop wastes:** Metal cuttings, shavings, filings, and pieces	Not expected to be generated
3	**Asbestos-containing material** (includes, but is not limited to, floor tiles, ceiling tiles, cement asbestos board, cove mastic, sheetrock tape, roofing materials, roof flashing, pipe and building insulation, gaskets, ventilation)	Contamination and integral asbestos fibers in building materials
		Potential radioactive contamination from past operations
4	**Miscellaneous aqueous liquids** identified in the facilities (including liquids collected from sumps, tanks, piping, processing equipment, and accumulated rainwater)	Residual from water treatment chemicals, decontamination materials, and reactor operations
		Potential airborne and/or waterborne radioactive and chemical contamination from past operations
5	**Miscellaneous bulk solids** identified in the facilities (including sludge and solid materials collected from sumps, tanks, and processing equipment)	Residue from water treatment chemicals, decontamination materials, and laboratory waste
		Potential solids, airborne and/or waterborne radioactive and chemical contamination from past operations
6	**Hydrocarbons:** Plant equipment lubrication grease, oil, hydraulic oils, transformer oils, oils in door actuators, and petroleum products (Bunker C and diesel oil) from plant piping systems	Residue from wear and corrosion, cleaning and decontamination materials, and lubricants
		Potential airborne and/or waterborne radioactive and chemical contamination from past operations
7	**Process tanks with specialized coatings**	Not expected to be generated
8	**Tank foundation material**	Not expected to be generated
9	**Boiler and stack residue**	Not expected to be generated
10	**Refrigerated systems** (e.g., drinking fountains, coolers, chillers)	Refrigerants
11	**Mercury containing equipment**	Elemental mercury in manometers, vacuum pumps, switches, mercury vapor lights, fluorescent lamp internals
12	Lead packing, washers, and shielding	Packing in pipe joints, lead washers and lead used for shielding
		Potential airborne and/or waterborne radioactive and chemical contamination from past operations
13	**Fluorescent light ballasts**	Polychlorinated biphenyl
14	**Fluorescent light tubes, incandescent light bulbs**	Lead, mercury components
15	Emergency light **batteries**	Battery constituents

Table 1-8. Routine Waste Streams and Source of Contamination at 100-K Area. (2 Pages)

WS #	Waste Stream (Affected Media)	Known or Suspected Source of Contamination
16	Exit signs and smoke detectors with **radioactive sources**	Tritium, americium
17	**Miscellaneous material for salvage** (e.g., pumps, motors)	Potential airborne and/or waterborne radioactive and chemical contamination from past operations
18	**Soil and sediment**	Residue from petroleum products and cleaning materials
		Residue from external application of herbicides and pesticides
		Potential airborne and/or waterborne radioactive and chemical contamination from past operations
19	**High-efficiency particulate air filters**	Potential radioactive and chemical contamination from past operations
20	**Unexpected media** and waste forms including solids and liquids	To be determined on a facility-specific basis
21	**Laboratory debris and laboratory wastes from 1706-KE and 1705-KW**	Potential airborne and/or waterborne radioactive and chemical contamination from past operations
22	**Equipment/systems and building structure left within the safe storage enclosure (this information collected for archive information purposes)** (including concrete, concrete block, steel, structural steel, plant process equipment, tanks, drain lines, electrical control panel, sheetrock, piping, tools, miscellaneous hardware, wire, and nonasbestos-containing structural materials)	Potential airborne and/or waterborne radioactive contamination from past reactor operations
23	Waste from biological sources (**feces, nests, carcasses**, etc.)	Potential airborne and/or waterborne radioactive and chemical contamination from piles or other sources of accumulation

WS = waste stream

Laboratory debris and laboratory wastes from 1706-KE and 1705-KW (waste stream #21) include several components that are regulated as a TSD unit under the RCRA. The components include an accumulation tank, an ion-exchange column, an evaporator unit, a condensate collection tank, and a high-efficiency particulate air filtration unit. The future closure plan may provide additional guidance and objectives for the management of wastes generated at this TSD unit.

1.4.1 Statement of the Problem

For proper waste disposition, a waste generated during ISS and D4 activities will need to be evaluated and/or characterized using approved sampling and analytical methods to determine if they are dangerous, radioactive, and/or mixed waste.

The primary disposal option for the waste is the Environmental Restoration Disposal Facility (ERDF). The ERDF waste acceptance criteria address the radiological, chemical, and physical forms of waste (BHI 2002). Liquid waste will either be sent to the Hanford Site's Effluent Treatment Facility (ETF) or treated to meet ERDF requirements. Liquid waste sent to the ETF will meet the ETF acceptance criteria (FH 2005b).

1.4.2 Decision Statements

Table 1-9 identifies the decision statements (DSs) that must be addressed for final disposition and disposal of demolition waste associated with ISS and D4 activities. These DSs are the result of Step 2 of the DQO process (WCH 2006).

Table 1-9. Decision Statements.

DS #	Decision Statements
1	Determine if the radionuclides present in the waste material exceed the disposal facility's waste acceptance criteria.
2	Determine if the chemical and/or physical properties of the waste material exceed the disposal facility's waste acceptance criteria limits.
3	Determine if the waste material is regulated as listed dangerous waste.
4	Determine if the characteristic dangerous waste codes (e.g., corrosivity, ignitability, reactivity, and toxicity) apply to the waste material.
5	Determine if the waste material meets the definition of a toxic dangerous waste in accordance with Washington State criteria.
6	Determine if the waste material meets the definition of a persistent dangerous waste in accordance with Washington State criteria.
7	Determine if the waste material is regulated due to PCB concentrations.
8	Determine if the waste material is regulated due to asbestos content.
9	Determine if LDRs impose treatment for waste material.
10	Determine if the affected media meets the recycling requirements.

DS = decision statement
LDR = land disposal restriction
PCB = polychlorinated biphenyl

1.4.3 Decision Rules

The decision rules are based on inputs from steps 2 through 5 of the DQO process (WCH 2006). The most restrictive concentration limits or action levels for disposal or recycle/reuse options are used. By meeting the analytical requirements for the most restrictive options, the data will be adequate for the less restrictive options.

As identified in the DQO process (WCH 2006), the most restrictive concentration limits include the following:

- *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, BHI-00139, Rev. 4 (BHI 2002)
- "Dangerous Waste Regulations," *Washington State Administrative Code* (WAC) 173-303, as amended
- "Universal Treatment Standards for Underlying Hazardous Constituents," 40 *Code of Federal Regulations* (CFR) 268.48
- *Liquid Waste Processing Facilities Waste Acceptance Criteria*, HNF-3172 (FH 2005b)
- *Hanford Site Solid Waste Acceptance Criteria*, HNF-EP-0063 (FH 2005a)
- "Licensing Requirements for Land Disposal of Radioactive Wastes," 10 CFR 61, as amended

The primary disposal option for the waste is the ERDF. The ERDF waste acceptance criteria address the radiological, chemical, and physical forms of waste (BHI 2002). Waste that does not meet the land disposal restrictions (WAC 173-303-140, 40 CFR 268) must be treated prior to disposal at the ERDF.

Liquid waste will either be sent to the Hanford Site's ETF or treated to meet the acceptance criteria of the receiving facility. Liquid waste sent to the ETF will meet the ETF acceptance criteria (FH 2005b).

The ERDF cannot accept transuranic waste, transuranic mixed waste, greater-than-class C waste (as defined by 10 CFR 61), high-level waste, or dangerous waste that does not meet the land disposal restrictions or cannot be treated by the ERDF.

1.4.4 Error Tolerance and Decision Consequences

Based on information developed in Step 6 of the DQO process (WCH 2006), a focused sampling design is suited for obtaining waste characterization information for all waste streams identified as needing additional data for final disposition. There is no error tolerance defined for a focused sampling design used for waste characterization purposes. The potential consequences for waste disposed at the ERDF are generally acknowledged to have a low degree of severity because the matrix will reside in an engineered facility remote from human population centers; in addition, the waste is retrievable if necessary.

1.4.5 Characterization Design Summary

The primary objective of the DQO process (WCH 2006) was to assess a general approach to support waste characterization of waste streams that are common to ISS and D4 operations. Historical information review, process knowledge, radiation scoping surveys, and facility inspections for each facility in accordance with Section 3.0 of this SAP will be used to develop a characterization approach.

If additional characterization information is needed to designate the waste materials, a focused (biased) sampling design will be selected that will meet the DSs for all of the waste streams identified in this project.

2.0 QUALITY ASSURANCE PROJECT PLAN

This quality assurance project plan (QAPjP) presents the policies, organizations, objectives, functional activities, methods, and quality assurance (QA)/quality control (QC) procedures for collecting and analyzing samples to support characterization of the 100-K Area facilities.

This QAPjP follows the EPA guidelines contained in *EPA Guidance for Quality Assurance Project Plans* (EPA 2002) and *EPA Requirements for Quality Assurance Project Plans* (EPA 2001).

2.1 PROJECT/TASK DESCRIPTION

The sampling and analysis strategy described in this SAP will be used to provide characterization data to safely and compliantly designate and dispose of demolition wastes generated during D4 activities at the 100-K Area facilities.

2.2 PROJECT MANAGEMENT

The following subsections address the basic areas of project management and will ensure that the project has defined goals, the participants understand the goals and approach to be used, and the participants understand the planned outputs.

2.2.1 Project/Task Organization

The following organizations will provide support for the sampling efforts:

- The ISS and D4 Projects will provide project management, project engineering and coordination of field support functions to support implementation of this SAP. This SAP is implemented under the direction of the ISS or D4 Project task lead. Support will include the following:

  - Provide project, task, and engineering management necessary to carry out tasks
  - Act as a liaison to current contractor functional organizations, as required
  - Provide the radiological work permits (RWPs)
  - Provide radiological surveys to support sample collection, packaging, and shipping
  - Provide radiological survey packages to summarize survey results
  - Prepare work packages to support the task team
  - Conduct and document pre-job meetings when supporting the task team
  - Provide field support to the task team
  - Provide the approved job hazard analysis
  - Provide industrial safety support and monitoring for the task team.

NOTE: Personal protective equipment to be worn during sampling shall be listed on the job-specific activity hazard analysis and the RWP, as required.

- The Waste Operations organization will provide waste management and disposal support. Support will include the following:
  - Provide waste designation
  - Prepare waste profiles
  - Provide coordination with other Hanford Site facilities (e.g., ETF and ERDF)
  - Provide a waste transportation specialist.
- The Environmental Sampling organization will provide personnel to support facility characterization, sample collection, sample packaging, sample shipment, and data management. Support will include the following:
  - Coordinate sampling and analysis activities
  - Perform/support sampling, packaging, and shipping activities of samples
  - Arrange for laboratory analysis of samples
  - Receive data packages from the laboratory
  - Arrange for validation of data to the level identified in this SAP
  - Provide laboratory data packages.
- The Quality Assurance organization shall be responsible for performing independent QA activities, as appropriate.
- Data users include the following:
  - Waste Operations
  - Engineering Services
  - Radiological Control
  - Safety and Health
  - The Washington State Department of Ecology and the DOE, Richland Operations Office.

2.3 TRAINING REQUIREMENTS/CERTIFICATION

Training or certification requirements needed by current contractor personnel are described in BSC-1, *Business Services and Communications,* Section 2.0, "Training."

Field personnel shall be trained and qualified to perform work activities. Minimum training requirements are as follows:

- Occupational Safety and Health Administration 40-Hour Hazardous Waste Worker Training
- Radiation Worker Training
- Hanford General Employee Training.

2.4 DATA QUALITY

The QA objective of this plan is to provide data of known and appropriate quality for the needs identified based on the DQO process (WCH 2006). Data quality is determined by assessing precision, accuracy, representativeness, comparability, and completeness (i.e., PARCC parameters). Definitions of these terms, applicable procedures, and level of effort are described below:

- Precision is a measure of the data spread when more than one measurement has been taken on the same material. Precision can be expressed as the relative percent difference for duplicate measurements.

- Accuracy is an assessment of the closeness of the measured value to the true value. Accuracy of chemical/radiological test results is assessed by spiking samples with known standards, performing the analysis, and establishing the average recovery. For matrix spikes, known amounts of a standard compound (either the analyte of interest or a surrogate material expected to behave chemically the same as the analyte of interest) are added to the samples and carried through the analysis. For some radionuclide measurements, method calibrations against known standards are used to establish accuracy. Laboratory matrix spikes will be used to assess analytical accuracy.

- Comparability expresses the confidence with which one data set can be compared to another. Data comparability will be maintained using defined procedures and consistent methods and units. Actual detection limits depend on the sample matrix and will be reported as defined for the specific samples.

- Completeness is a measure of the amount of valid data obtained from the analytical measurement system and the complete implementation of defined field procedures. Completeness is assessed during the data validation process.

- Representativeness is a measure of how closely the results reflect the actual concentration or distribution of the chemical compounds in the matrix samples. Documentation will be established to show that protocols have been followed and sample identification and integrity are ensured. Field duplicates may be used to assess field and transport contamination and method variation. Laboratory method blanks will be used to assess potential sample contamination from laboratory operations.

2.5 FIELD DOCUMENTATION

Field documentation shall be maintained in accordance with ENV-1, *Environmental Monitoring & Management*, ENV-1-2.5, "Field Logbooks," and ENV-1-2.13, "Chain of Custody."

The standard fixed laboratory (SFL) data packages shall be managed in accordance with ENV-1-2.11, "Sampling Documentation Processing."

2.6 CHANGE CONTROL

The sample authorization form (SAF)/field sampling requirement information generated through the sample event coordination process shall specify the sampling container, size, and preservatives; onsite measurement test methods; laboratory analytical methods; turnaround times; and data deliverable types.

To ensure efficient and timely completion of tasks, minor changes can be made to the original workscope (outlined in this SAP) in the field by the characterization lead (or designee), provided that the changes do not impact the technical adequacy of the job or negatively impact the work schedule. Such changes shall be documented with justification in a field logbook.

2.7 MEASUREMENT/DATA ACQUISITION

The following subsections present quality objectives for measurement data and requirements for sampling methods, sample handling and custody, analytical methods, and field and laboratory QC. The requirements for instrument calibration and maintenance supply inspections and data management are also discussed.

2.7.1 Analytical Performance Requirements

Tables 2-1 through 2-3 define the analytical performance requirements (e.g., practical quantitation limit, precision, and accuracy) for comparison of existing data and/or for any new data that need to be collected. These tables reflect analyses that are routinely associated with solids, oils, aqueous liquids, and anomalous media (i.e., liquids and solids) that are routinely encountered during ISS and D4 activities. Action level and performance requirements include the required detection limit and precision and accuracy requirements. The specific methods (e.g., EPA Method 6010), action levels, and required detection limits described in Tables 2-1 and 2-2 are preliminary and are based on the analytical laboratory contracts. Table 2-3 includes information for field instrumentation. Actual laboratory reporting limits may be higher due to sample-specific matrix interference. The sample-specific detection limits will be reported for individual analytes.

Table 2-1. Analytical Performance Requirements for Solid/Other Materials. (2 Pages)

Analyte	Analytical Method	RDL Requirement	Accuracy (% Recovery)	Precision (% RPD)
Radiological Constituents				
Americium-241	AmAEA	1 pCi/g	70-130[a]	±30[a]
Antimony-125	GEA	0.2 pCi/g	70-130[a]	±30[a]
Carbon-14	Liquid scintillation	50 pCi/g	70-130[a]	±30[a]
Cesium-137	GEA	0.1 pCi/g	70-130[a]	±30[a]
Cobalt-60	GEA	0.05 pCi/g	70-130[a]	±30[a]
Europium-152	GEA	0.1 pCi/g	70-130[a]	±30[a]
Europium-154	GEA	0.1 pCi/g	70-130[a]	±30[a]
Europium-155	GEA	0.1 pCi/g	70-130[a]	±30[a]
Neptunium-237	NpAEA	1 pCi/g	70-130[a]	±30[a]
Plutonium-238	PuAEA	1 pCi/g	70-130[a]	±30[a]
Plutonium-239/240	PuAEA	1 pCi/g	70-130[a]	±30[a]
Radium-226	GEA	0.1 pCi/g	70-130[a]	±30[a]
Radium-228	GEA	0.2 pCi/g	70-130[a]	±30[a]
Total strontium	Rad-Sr	1 pCi/g	70-130[a]	±30[a]
Technetium-99	Proportional counting	15 pCi/g	70-130[a]	±30[a]
Thorium-232	ThAEA	1 pCi/g	70-130[a]	±30[a]
Tritium	Liquid scintillation	400 pCi/g	70-130[a]	±30[a]
Uranium-233/234	UAEA	1 pCi/g	70-130[a]	±30[a]
Uranium-235/236	UAEA	1 pCi/g	70-130[a]	±30[a]
Uranium-238	UAEA	1 pCi/g	70-130[a]	±30[a]
Nonradiological Constituents – Metals				
Arsenic	EPA Method 6010	10 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.5 mg/L	70-130[b]	±30[b]
Barium	EPA Method 6010	2 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	10 mg/L	70-130[b]	±30[b]
Cadmium	EPA Method 6010	0.5 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.01 mg/L	70-130[b]	±30[b]
Chromium	EPA Method 6010	10 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.06 mg/L	70-130[b]	±30[b]
Lead	EPA Method 6010	5 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.075 mg/L	70-130[b]	±30[b]
Mercury	EPA Method 7471	0.2 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/7471	0.02 mg/L	70-130[b]	±30[b]

Table 2-1. Analytical Performance Requirements for Solid/Other Materials. (2 Pages)

Analyte	Analytical Method	RDL Requirement	Accuracy (% Recovery)	Precision (% RPD)
Selenium	EPA Method 6010	10 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.5 mg/L	70-130[b]	±30[b]
Silver	EPA Method 6010	1 mg/kg	70-130[b]	±30[b]
	EPA Method 1311/6010	0.01 mg/L	70-130[b]	±30[b]
Nonradiological Constituents – General Inorganics				
Asbestos	PLM	<1 wt%	N/A	N/A
Organic Compounds				
Ethylene Glycol	EPA Method 8015	5 mg/kg	50-150[d]	±30[d]
PCBs	EPA Method 8082	0.017 mg/kg	50-150[d]	±30[d]
Pesticides	EPA Method 8081	0.005 to 0.020 mg/kg[c]	50-150[d]	±30[d]
Waste Characteristics				
Corrosivity	EPA Method 9045 (pH)	0.1 pH unit	70-130[b]	±30[b]
Ignitability (flash point)	EPA Method 1010	N/A	N/A	N/A
SVOAs	EPA Method 8270	0.33 to 0.85 mg/kg[c]	50-150[d]	±30[d]
VOAs	EPA Method 8260	0.005 to 0.05 mg/kg[c]	50-150[d]	±30[d]

[a] Accuracy criteria for associated batch laboratory control sample percent recoveries. With the exception of GEA, additional analysis-specific evaluations also performed for matrix spikes, tracers, and carriers, as appropriate to the method. Precision criteria for batch laboratory replicate sample analyses.

[b] Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples also performed. Precision criteria for batch laboratory replicate matrix spike sample analyses or replicate sample analyses.

[c] Values shown are "nominal" compound-specific minimums and maximums. Most constituents will be within the given range, and a limited number will have higher detection limits. Individual compounds will be evaluated against established laboratory contractual agreements (based on EPA guidance documents).

[d] Accuracy criteria are the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control if more stringent. Additional analyte-specific evaluations also performed for matrix spikes and surrogates as appropriate to the method. Precision criteria for batch laboratory replicate matrix spike sample analyses.

NOTE: EPA test methods from *Test Methods for Evaluating Solid Waste: Physical and Chemical Methods,* SW-846 (EPA 1986), except for Methods 300.0 and 418.1, which are from EPA's *Methods for Chemical Analysis of Water and Wastes* (EPA 1983). Analytical laboratories are contractually obligated to meet the current methodology required by regulatory agencies.

AEA = alpha energy analysis
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
N/A = not applicable
PCB = polychlorinated biphenyl
PLM = polarized light microscopy
RDL = required detection limit
RPD = relative percent difference
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

Table 2-2. Analytical Performance Requirements for Liquid Materials. (3 Pages)

Analyte	Analytical Method	RDL Requirement	Accuracy (% Recovery)	Precision (% RPD)
Radiological Constituents				
Americium-241	AmAEA	1 pCi/L	80-120[a]	±20[a]
Antimony-125	GEA	50 pCi/L	80-120[a]	±20[a]
Carbon-14	Liquid scintillation	200 pCi/L	80-120[a]	±20[a]
Cesium-137	GEA	15 pCi/L	80-120[a]	±20[a]
Cobalt-60	GEA	25 pCi/L	80-120[a]	±20[a]
Europium-152	GEA	50 pCi/L	80-120[a]	±20[a]
Europium-154	GEA	50 pCi/L	80-120[a]	±20[a]
Europium-155	GEA	50 pCi/L	80-120[a]	±20[a]
Neptunium-237	NpAEA	1 pCi/L	80-120[a]	±20[a]
Plutonium-238	PuAEA	1 pCi/L	80-120[a]	±20[a]
Plutonium-239/240	PuAEA	1 pCi/L	80-120[a]	±20[a]
Radium-226	EPA Method 903.1	1 pCi/L	80-120[a]	±20[a]
Radium-228	EPA Method 904.0	1 pCi/L	80-120[a]	±20[a]
Total strontium	Rad-Sr	2 pCi/L	80-120[a]	±20[a]
Technetium-99	Proportional counting	15 pCi/L	80-120[a]	±20[a]
Thorium-232	ThAEA	1 pCi/L	80-120[a]	±20[a]
Tritium	Liquid scintillation	400 pCi/L	80-120[a]	±20[a]
Uranium-233/234	UAEA	1 pCi/L	80-120[a]	±20[a]
Uranium-235/236	UAEA	1 pCi/L	80-120[a]	±20[a]
Uranium-238	UAEA	1 pCi/L	80-120[a]	±20[a]
Nonradiological Constituents – Metals				
Aluminum	EPA Method 6010	50 µg/L	80-120[b]	±20[b]
Antimony	EPA Method 6010	60 µg/L	80-120[b]	±20[b]
Arsenic	EPA Method 6010	100 µg/L	80-120[b]	±20[b]
Barium	EPA Method 6010	20 µg/L	80-120[b]	±20[b]
Boron	EPA Method 6010	20 µg/L	80-120[b]	±20[b]
Beryllium	EPA Method 6010	5 µg/L	80-120[b]	±20[b]
Cadmium	EPA Method 6010	5 µg/L	80-120[b]	±20[b]
Calcium	EPA Method 6010	1,000 µg/L	80-120[b]	±20[b]

Table 2-2. Analytical Performance Requirements for Liquid Materials. (3 Pages)

Analyte	Analytical Method	RDL Requirement	Accuracy (% Recovery)	Precision (% RPD)
Chromium	EPA Method 6010	10 µg/L	80-120[b]	±20[b]
Copper	EPA Method 6010	10 µg/L	80-120[b]	±20[b]
Iron	EPA Method 6010	50 µg/L	80-120[b]	±20[b]
Lead	EPA Method 6010	50 µg/L	80-120[b]	±20[b]
Magnesium	EPA Method 7470	750 µg/L	80-120[b]	±20[b]
Manganese	EPA Method 7470	5 µg/L	80-120[b]	±20[b]
Mercury	EPA Method 7470	0.5 µg/L	80-120[b]	±20[b]
Nickel	EPA Method 6010	40 µg/L	80-120[b]	±20[b]
Potassium	EPA Method 6010	4,000 µg/L	80-120[b]	±20[b]
Selenium	EPA Method 6010	100 µg/L	80-120[b]	±20[b]
Silicon	EPA Method 6010	20 µg/L	80-120[b]	±20[b]
Silver	EPA Method 6010	10 µg/L	80-120[b]	±20[b]
Sodium	EPA Method 6010	500 µg/L	80-120[b]	±20[b]
Vanadium	EPA Method 7470	25 µg/L	80-120[b]	±20[b]
Zinc	EPA Method 6010	10 µg/L	80-120[b]	±20[b]
Nonradiological Constituents – General Inorganics				
Ammonia	EPA Method 350.X	50 µg/L	80-120[b]	±20[b]
Bromide	EPA Method 300.0	250 µg/L	80-120[b]	±20[b]
Chloride	EPA Method 300.0	200 µg/L	80-120[b]	±20[b]
Cyanide	EPA Method 9010	5 µg/L	80-120[b]	±20[b]
Fluoride	EPA Method 300.0	500 µg/L	80-120[b]	±20[b]
Iodide	EPA Method 345.1	500 µg/L	80-120[b]	±20[b]
Nitrate	EPA Method 300.0	250 µg/L	80-120[b]	±20[b]
Nitrite	EPA Method 300.0	250 µg/L	80-120[b]	±20[b]
Phosphate	EPA Method 300.0	500 µg/L	80-120[b]	±20[b]
Sulfide	EPA Method 9030	100 µg/L	80-120[b]	±20[b]
Sulfate	EPA Method 300.0	500 µg/L	80-120[b]	±20[b]
Waste Characteristics				
Conductivity	EPA Method 120.1	1 µmho/cm^3	80-120[b]	±20[b]
Corrosivity	EPA Method 150.1 (pH)	0.1 pH unit	80-120[b]	±20[b]

Table 2-2. Analytical Performance Requirements for Liquid Materials. (3 Pages)

Analyte	Analytical Method	RDL Requirement	Accuracy (% Recovery)	Precision (% RPD)
Gross alpha	Proportional counting	3 pCi/L	80-120[a]	±20[a]
Gross beta	Proportional counting	4 pCi/L	80-120[a]	±20[a]
Ignitability	EPA 1010	1°C	NA	NA
SVOAs	EPA Method 8270	10 to 50 µg/L[c]	50-150[d]	±20[d]
TDS	EPA Method 160.1	10 mg/L	80-120[b]	±20[b]
TOC	EPA Method 415 or 9060	1 mg/L	80-120[b]	±20[b]
TSS	EPA Method 160.2	5 mg/L	80-120[b]	±20[b]
TOX	EPA Method 9020	20 mg/L	80-120[b]	±20[b]
VOAs	EPA Method 8260	5 to 50 µg/L[c]	50-150[d]	±20[d]

[a] Accuracy criteria for associated batch laboratory control sample percent recoveries. With the exception of GEA, additional analysis-specific evaluations also performed for matrix spikes, tracers, and carriers, as appropriate to the method. Precision criteria for batch laboratory replicate sample analyses.

[b] Accuracy criteria for associated batch matrix spike percent recoveries. Evaluation based on statistical control of laboratory control samples also performed. Precision criteria for batch laboratory replicate matrix spike sample analyses or replicate sample analyses.

[c] Values shown are "nominal" compound-specific minimums and maximums. Most constituents will be within the given range, and a limited number will have higher detection limits. Individual compounds will be evaluated against established laboratory contractual agreements (based on EPA guidance documents).

[d] Accuracy criteria are the minimum for associated batch laboratory control sample percent recoveries. Laboratories must meet statistically based control if more stringent. Additional analyte-specific evaluations also performed for matrix spikes and surrogates as appropriate to the method. Precision criteria for batch laboratory replicate matrix spike sample analyses.

NOTE: EPA test methods are from *Test Methods for Evaluating Solid Waste: Physical and Chemical Methods*, SW-846 (EPA 1986), except for Methods 300.0 and 418.1, which are from EPA's *Methods for Chemical Analysis of Water and Wastes* (EPA 1983). Analytical laboratories are contractually obligated to meet the current methodology required by regulatory agencies.

AEA = alpha energy analysis
EPA = U.S. Environmental Protection Agency
GEA = gamma energy analysis
RDL = required detection limit
RPD = relative percent difference
SVOA = semivolatile organic analysis
TDS = total dissolved solids
TOC = total organic carbon
TSS = total suspended solids
TOX = total organic halides
VOA = volatile organic analysis

Table 2-3. Radiological Survey Instrument Performance Requirements.

Analyte	Analytical Method	Detection Limit (expected)	Accuracy Requirement	Precision Requirement
Standard Survey Instruments				
Dose rate	Portable sodium iodide detector or Bicron[a] µrem meter or ion chamber	0.1 mR/h	[b]	[b]
Removable alpha	Bench-top scaler for removable alpha Portable radiation detector	20 dpm/ 100 cm^2	[b]	[b]
Total (fixed + removable) alpha		100 dpm/ 100 cm^2	[b]	
Removable beta-gamma		1,000 dpm/ 100 cm^2	[b]	
Total (fixed + removable) beta-gamma		5,000 dpm/ 100 cm^2	[b]	
Tritium	Liquid scintillation	10,000 dpm/ 100 cm^2	[b]	[b]
Other Advanced Radionuclide Characterization				
Removable alpha	Electra Plus survey instrument with DP-8B 600-cm^2 probe[c]	20 dpm/100 cm^2	[b]	[b]
Total (fixed + removable) alpha		100 dpm/100 cm^2	[b]	
Removable beta-gamma		1,000 dpm/ 100 cm^2	[b]	
Total (fixed + removable) beta-gamma		5,000 dpm/ 100 cm^2	[b]	
Americium-241	Non-Destructive Assay[d] (ISOCS, or equivalent)	2 pCi/g	[b]	[b]
Cobalt-60		10 pCi/g	[b]	
Cesium-137		10 pCi/g	[b]	
Euporium-152		10 pCi/g	[b]	
Euporium-154		10 pCi/g	[b]	
Euporium-155		2 pCi/g	[b]	
Neptunium-237		100 pCi/g	[b]	
Plutonium-239		30,000 pCi/g	[b]	

[a] Bicron/NE, Solon, Ohio.
[b] In accordance with manufacturer's specifications.
[c] Written direction will be provided to address the data, procedures, and quality requirements prior to using this equipment for waste designation.
[d] Not all of the radionuclides of interest can be directly measured through gamma spectroscopy; therefore, isotopic ratios or scaling factors must be provided for the nondetectable nuclides.
dpm = disintegrations per minute
ISOCS = In Situ Object Counting System, Canberra Industries, Meriden, Connecticut

2.7.2 Standard Fixed Laboratory Methods

Analytical parameters and methods are listed in Tables 2-1 and 2-2. The QA/QC procedures, detection limit requirements, and documentation for individual methods will be in accordance with the specifications outlined in the *Statement of Work for Environmental and Work Characterization Analytical Services* (RFS 1999). Laboratory-specific standard operating procedures for individual analytical methods will also be implemented.

2.7.3 Standard Fixed Laboratory Quality Control Requirements

The minimum QC sample requirements for the analytical laboratory will meet the requirements identified in the *Hanford Analytical Services Quality Assurance Requirements Document* (DOE-RL 1998). The requirements in this document are implemented through the analytical service statement of work (RFS 1999) and are as follows:

- One laboratory method blank for every 20 samples (5% of all samples), analytical batch, or sample delivery group (whichever is most frequent) will be carried through the complete sample preparation and analytical procedure. The method blank will be used to document contamination resulting from the analytical process.
- One laboratory control sample or blank spike will be performed for every batch of samples for each analytical method criterion to monitor the effectiveness of the sample preparation process. The results from the analysis are used to assess laboratory performance.
- As appropriate, a matrix spike sample will be prepared and analyzed for every 20 samples of the same matrix or sample preparation batch, whichever is most frequent. The matrix spike results are used to document the bias of an analytical process in a given matrix.
- Laboratory duplicates or matrix spike duplicates will be used to assess precision and will be analyzed at the same frequency as the matrix spikes.

2.7.4 Field Quality Control Requirements

Collection and analysis of field duplicate samples is not considered necessary or practical. Data validation will not be conducted. The potential for adverse impacts to data quality is minimal and, if needed, opportunities to resample a particular material due to suspect data will exist.

Collection and analysis of equipment blanks and trip blanks is not considered necessary or practical. Data validation will not be conducted. In addition, assessment of blank samples to determine low levels of potential contaminants is not needed for analytical data used for waste characterization where worst-case values and conservative assumptions are normally applied. The potential for adverse impacts to data quality is minimal and, if needed, opportunities to resample a particular material due to suspect data will exist.

Collection and analysis of split samples is not considered necessary for the sampling activities included in this SAP. Comparison of laboratory precision and accuracy is not considered practical or necessary for waste designation data.

2.7.5 Inspection/Acceptance Requirements for Supplies and Consumables

Procurement activities will meet the requirements of the current contractor procurement with procurement procedures found in BSC-300, *WCH Procurement.* Received items and reagents will be inspected for conformance with specifications set in the procurement requisition. If the items or reagents do not meet specifications, the items/reagents will be dispositioned through the nonconformance system.

2.7.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Equipment used in the field or laboratory that directly affects analytical data quality will be subject to preventive maintenance to ensure minimal measurement system downtime.

2.7.7 Instrument Calibration and Frequency

All onsite instruments used for sample analysis shall be calibrated in accordance with ENV-1-2.36, "River Corridor Quality Assurance Program Plans." The results from all instrument calibration activities shall be recorded in a bound logbook in accordance with ENV-1-2.5, "Field Logbooks," or as specified for radiological surveys. Where applicable, tags will be attached to field screening and onsite analytical instruments to note the date when the instrument was last calibrated and the calibration expiration date.

2.7.8 Data Management

Laboratory data will be managed and stored by the current contractor's sample management organization in accordance with ENV-1-2.10, "Sample Event Coordination."

All analytical data packages shall be subject to final technical review by qualified reviewers before submittal to regulatory agencies or inclusion in reports or technical memoranda, at the direction of the D4 or ISS project task lead. Electronic data access, when appropriate, shall be through computerized databases (e.g., Hanford Environmental Information System). Where electronic data are not available, hard copies will be provided in accordance with Section 9.6 of the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1989).

2.8 ASSESSMENT/OVERSIGHT

2.8.1 Assessments and Response Actions

The Compliance and Quality Programs group may conduct random surveillance and assessments in accordance with QA-1, *Quality Assurance,* QA-1-1.7, "WCH Surveillances – Internal, Subcontractor and other Hanford Contractors," to verify compliance with requirements outlined in the sampling and analysis instruction, project work packages, Washington Closure Hanford procedures, and regulatory requirements.

Deficiencies identified by any of these assessments shall be reported in accordance with QA-1-1.5, "Self-Assessment." When appropriate, corrective actions will be taken by the project engineer in accordance with *Hanford Analytical Services Quality Assurance Requirements Documents*, Vol. 1, Section 4.0 (DOE-RL 1998) to minimize recurrence.

2.8.2 Reports to Management

Management shall be made aware of deficiencies identified by assessments or self-assessments. Corrective action required as a result of surveillance reports, nonconformance reports, or audit activities will be documented and dispositioned as required by QA-1-1.1, "Corrective Action Request." Other measurement systems, procedures, or plan corrections required as a result of routine review processes will be resolved by governing procedures or will be referred to the technical lead for resolution. Findings from audits, surveillance, and assessments will be transmitted to the project manager and the current contractor's QA department for program-related tracking and trending. Otherwise, the routine evaluation of data quality described throughout this QAPjP will be documented and filed with the data in the project file.

2.9 DATA VALIDATION AND USABILITY

2.9.1 Data Review and Verification Requirements

Data review and verification will be performed on analytical data sets to confirm sampling and chain-of-custody documentation are complete, sample numbers can be tied to the specific sampling location, samples were analyzed within the required holding times, and analyses met the data quality requirements specified in this SAP. Data collected in accordance with this SAP will not be used to determine final closure decisions and the potential for adverse impacts related to data quality issues is minimal. Therefore, the data will not undergo formal data validation. Routine verification of data packages will be conducted in accordance with ENV-1-2.11, "Sample Documentation Processing."

2.9.2 Data Validation Requirements

Data collected in accordance with this SAP is not intended to be used to determine final closure decisions; therefore, the data will not be required to undergo formal data validation. In addition, assessment of blank samples to determine low levels of potential contaminants is not needed for analytical data used for waste characterization. The potential for adverse impacts to the data quality is minimal and, if needed, opportunities to resample a particular material due to suspect data will exist.

2.10 FIELD SAMPLING PROCEDURES

2.10.1 Sample Collection Requirements

Field sampling methodology will be implemented in accordance with the requirements outlined in ENV-1, including the following procedures:

- ENV-1-2.16, "Soil and Sediment Sampling"
- ENV-1-2.19, "Environmental Media Sampling"
- ENV-1-2.20, "Sample Compositing."

2.10.2 Shipping, and Sample Custody Requirements

Sample handling, shipping, and custody requirements will be implemented in accordance with the requirements outlined in ENV-1, including the following procedures:

- ENV-1-2.13, "Chain of Custody"
- ENV-1-2.14, "Sample Packaging and Shipping"
- ENV-1-2.17, "Sample Storage and Shipping Facility."

The sample handling, shipping, and custody requirements shall consider RCRA-listed waste codes. These waste codes shall be recorded on the SAF and the chain-of-custody form.

2.10.3 Sample Volumes, Preservation, Container Requirements, and Holding Times

Sample volumes and bottle types depend on the laboratory and analytical methods used. Sample preservation, container types and sizes, analytical methods, and holding time requirements for the analysis to be performed will be established and documented in the project-specific SAFs in accordance with ENV-1-2.10, "Sample Event Coordination." Bottle types, preservation, and holding times are based wherever possible on established protocols (e.g., EPA SW-846) and/or industry standard practices. The allowable holding times will be identified on the SAF for unique sample events if holding times cannot be met. The reason for not meeting the holding times shall be documented in the field logbook or in the data package from the laboratory.

2.11 SURVEY MEASUREMENT PROCEDURES

Survey activities shall be implemented in accordance with the current version of the applicable current contractor procedures.

2.11.1 Scoping Surveys

Characterization scoping surveys will be completed for each facility or group of similar facilities in the scope of this project. The scoping surveys are composed of routine radiological surveys and Industrial Hygiene (IH) baseline surveys. Scoping surveys will be conducted prior to any major equipment or material removal activities to determine the nature and extent of contamination in the facility.

Radiological scoping surveys will be implemented in accordance with RC-200, *Radiological Control Field Procedures*, RC-200-4.2, "Radiological Surveys." The instruments are operated and maintained in accordance with RC-300, *Radiological Control Instrumentation Procedures*, RC-300-2.1, "Performance Checks of Portable Instruments."

Industrial hygiene scoping surveys will be implemented in accordance with SH-1, *Safety and Health*, SH-1-4.3, "Industrial Hygiene Surveys."

2.11.2 Material Release Surveys for Reuse or Recycle

Material release surveys will be performed in accordance with RC-200-4.4, "Material Release." Instrument calibrations and survey records will be completed in accordance with RC-300-2.1, "Performance Checks of Portable Instruments," and survey records will be completed in accordance with RC-200-4.2, "Radiological Surveys."

3.0 FIELD SAMPLING PLAN

The objective of the field sampling plan (FSP) is to delineate the field activities, sampling and analysis activities, and procedures needed to address Step 5 of the DQO summary report (WCH 2006). The following sections summarize field characterization activities, scoping survey strategies, media sampling strategies, and sampling and analysis activities to be implemented in the field.

3.1 OBJECTIVE

A focused (biased) sampling design to estimate worst-case concentrations in media where contamination can be reliably expected to be found is suited to provide characterization information that will meet the objectives identified for this project. Otherwise, statistical sampling designs may be prepared as discussed in Section 3.2.7. Historical information, inspections, scoping surveys, and analytical sampling data will be collected to meet the following objectives:

- Establish worst-case, upper bounding estimates of contaminant levels in order to characterize waste streams associated with each type of facility
- Provide characterization data to support waste management decisions for disposition of materials.
- Identify potential hazards and support health and safety decisions.

3.2 CHARACTERIZATION DESIGN

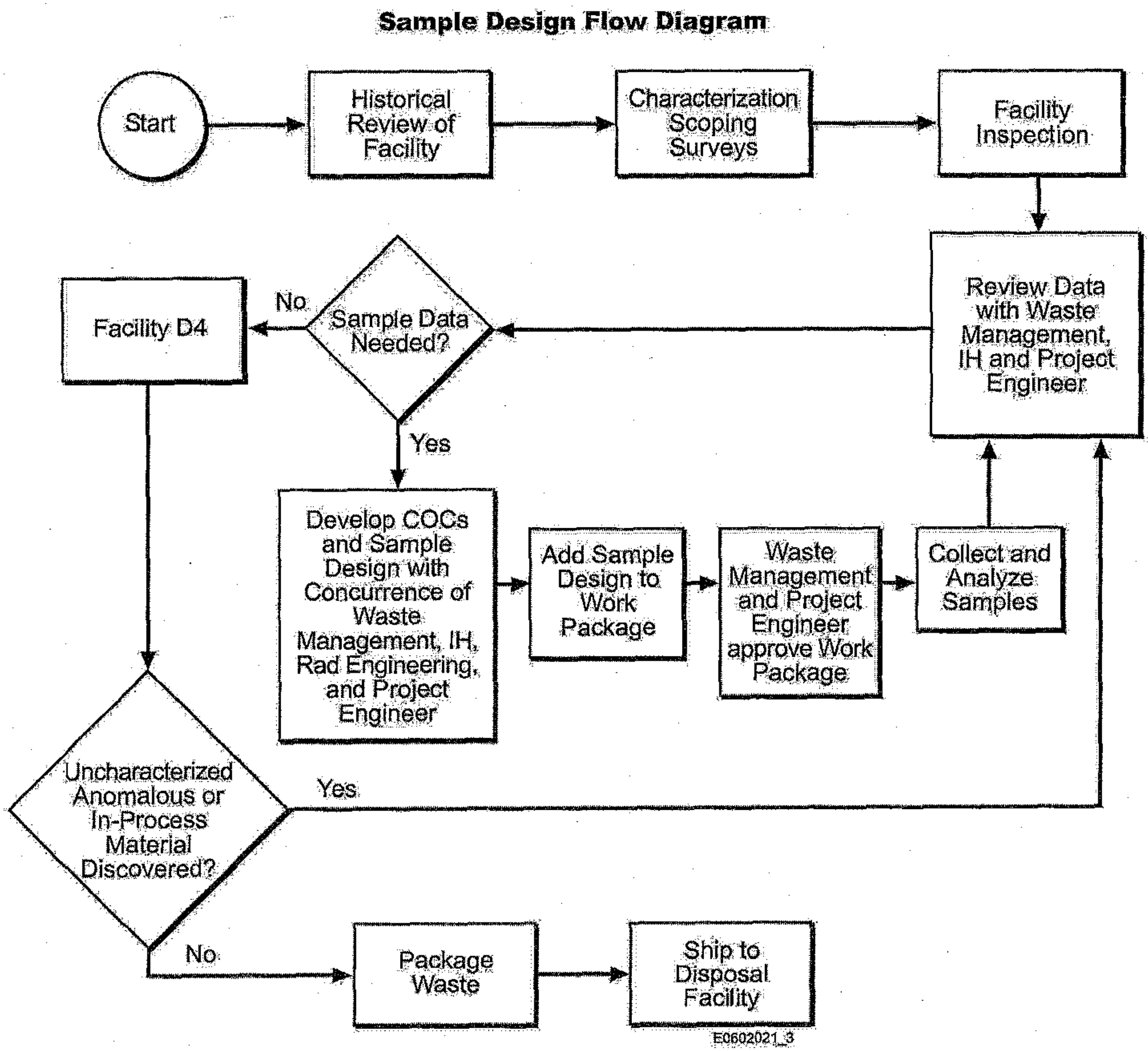
Sample designs will be developed by the characterization lead using historical information, process knowledge, scoping surveys, and facility walkdowns. The final sample design decisions will be developed with the concurrence of the D4 or ISS project team, which will include the project characterization lead and technical specialists (i.e., Waste Operations and Engineering Services).

Figure 3-1 shows a flow diagram of the sample design that will be used to characterize waste materials to support 100-K Area D4 and ISS activities.

3.2.1 Pre-Demolition Characterization

Pre-demolition characterization will be conducted for facilities in the scope of this SAP to identify potential hazards, determine health and safety requirements, establish radiological and chemical contamination levels, and determine appropriate waste management requirements. Pre-demolition characterization will include activities described in the following subsections.

Figure 3-1. Sample Design Flow Diagram.



3.2.1.1 Historical Site Assessment. Historical information will be identified, reviewed, summarized, and documented for facilities prior to demolition. Information reviewed will include the *Waste Information Data System* and *Hanford Environmental Information System* databases, facility drawings, historical reports, deactivation files (if available), radiation survey reports, and other pertinent sources.

3.2.1.2 Characterization Scoping Survey. Characterization scoping surveys (CSSs) will be completed for facilities within the scope of this project. The CSS will consist of routine radiation surveys of accessible surfaces of the waste media conducted by the project radiological control technicians. Additional uniformly distributed and/or biased measurements may be collected at the discretion of the project radiological engineer.

The CSS may also include an IH baseline survey of the facility conducted by the project IH technicians. IH surveys consisting of uniformly distributed and/or biased measurements for specific contaminants (e.g., beryllium dust) may be collected at the discretion of the project IH professional.

All areas within the facilities may not have the same potential for contamination and therefore will not require the same level of survey coverage. Facilities may be designated into survey areas to facilitate the CSS. "Survey area" is a general term referring to any portion of a facility. For example, a survey area could be a group of facilities, a single facility, or one or more rooms within a facility. Survey areas will be delineated based on contamination potential, considering historical information and current radiological postings. The project radiological engineer, IH professional, and characterization lead will be responsible for dividing the facilities into appropriate survey areas.

Information from scoping surveys will be used to determine the extent of contamination in the facility and support worker health and safety decisions during D4 activities. The scoping surveys are not intended for waste designation purposes.

3.2.1.3 Facility Inspection. Facilities will be inspected prior to demolition. The inspection will include an assessment of hazardous materials (radiological and chemical) and potentially hazardous materials contained in or a part of the facility. The inspection should include checking areas of material buildup such as sumps, drains, ventilation ductwork, and other effluent handling systems. Potential media-specific sampling locations may be identified during the inspection. Identification of anomalous materials and conditions is an important part of this activity. Photographs and sketches of the site may be used to support the inspection. Information obtained during the inspection will be documented on a summary sheet.

3.2.1.4 Characterization Work Package. Based on the results of the facility inspection, an initial characterization plan may be prepared. In some cases no further information will be needed to support waste management decisions. In these cases no sampling will be required.

When characterization sampling is needed, a sample design will be developed with the concurrence of the waste management subject matter expert (SME) and, as needed, radiological engineering, safety and health, and the IH SME. The sample design will identify the number of samples needed, where the samples should be collected, the required analyses, and any specific sampling requirements. The sample design information will be incorporated into the characterization work package for the specific facility. The work package will be approved by the project superintendent, waste management SME, and project engineer. Field sampling will be planned and conducted in accordance with the work package.

Additional materials needing characterization may be discovered during deactivation of the facility. The sample design information for any additional characterization will be added to the characterization work package with concurrence of the waste management SME and, as needed, radiological engineering, safety and health, and the IH SME. The facility-specific work package will be approved by the project superintendent, waste management SME, and the project engineer. Field sampling will be planned and conducted in accordance with the work package.

3.2.2 Specific Media Sampling

Existing data and process knowledge will be used to support safety and health and waste management decisions. The goal of specific media sampling is to determine the nature and extent of radiological and/or chemical contaminants to support waste management decisions. The sample data may also support safety and health decisions.

Surface media samples (e.g., flooring material, roofing material, pipe scale, filters, and sediment) will be collected, as needed, to provide focused characterization data if the pre-demolition characterization effort indicates such samples are warranted. The surface media samples will be collected from biased sampling locations based on the judgment of the project characterization lead, waste management SME, radiological engineer, and/or other subject matter specialists as appropriate.

If a potential pathway for volumetric contamination exists and historical information or characterization walkdowns indicate that volumetric sampling is warranted, volumetric samples may be collected for analysis as part of the biased sampling measurements. Such samples (e.g., concrete or cinderblock boring samples) will be collected in areas where contamination may have migrated into base materials. For example, volumetric samples may be collected in areas that have a history of repeated spills of contaminated liquids. The samples will be collected from worst-case sampling locations based on the judgment of the project characterization lead, waste management SME, radiological engineer, and other subject matter specialists as appropriate. If worst-case sampling locations cannot be reliably determined, a statistical sampling design may be developed as discussed in Section 3.2.7 of this SAP.

3.2.3 In-Process Media Sampling

Specific media may be sampled to characterize materials for disposal. This may include drummed or bulk liquids, solids, or sludge materials.

A single sample may be used to characterize containerized liquid media provided that a representative profile of the material can be obtained during sampling. If strata are identified in the material, subsampling of identified strata may be required to adequately characterize the material.

Containerized or bulk solids, sediment, or sludge media are generally considered more likely to be heterogeneous than liquid materials. Discrete samples may be obtained from the same source to characterize solids, sediment, or sludge material at locations of high potential contamination. Field radiological measurements and visual observations shall be used to determine biased sampling locations.

The samples will be analyzed for the radiological and chemical COCs identified in the characterization work package. Analytical performance requirements are established in Tables 2-1 and 2-2 of this SAP.

The laboratory data will be used to confirm contamination levels in each of the materials and determine the appropriate disposition of the waste materials. Containerized aqueous liquids and petroleum products may be evaluated for reuse or recycling.

3.2.4 Radiological Material Release Surveys for Reuse

Salvageable materials that have no potential for volumetric contamination may be surveyed for release. The material release surveys will involve routine radiation surveys of accessible surfaces of the waste materials conducted and documented in accordance with the requirements identified in Section 2.11.2 of this SAP.

Additional surveys for offsite release will be conducted, as needed, in accordance with appropriate property release requirements.

3.2.5 Anomalous Waste Materials

Anomalous waste materials include any unanticipated material discovered during D4 operations that will require sampling and analysis to support disposition. Sampling and analytical decisions will be made for the materials based on consultation between the project characterization lead, waste management SME, radiological engineer, project environmental lead, and other subject matter specialists as needed. The team will evaluate appropriate historical information, process knowledge, and existing analytical data to determine if additional analytical information is needed to support waste management decisions.

3.2.6 Statistical Sample Design

This SAP is based on use of a focused (biased) sample design to provide upper bounding data to support waste management decisions. If a particular waste media or contaminated matrix is encountered that warrants use of a statistical sample design, such a design will be developed during the pre-demolition characterization activities. The statistical sample design will be reviewed and approved by the project and functional representatives as a part of the characterization activities discussed in this section.

4.0 MANAGEMENT OF SAMPLING ACTIVITY WASTE

Waste generated as a result of sampling activities will be managed in accordance with the 100-K Area RAWP (DOE-RL 2005). Unused samples and associated laboratory waste from the analysis will be dispositioned in accordance with the laboratory contract.

Pursuant to 40 CFR 300.440, EPA project manager approval is required before returning unused samples or wastes from offsite laboratories located offsite. Approval of this SAP constitutes EPA project manager approval for shipment of samples and sample waste from the Hanford Site laboratories back to the waste site of origination.

5.0 HEALTH AND SAFETY

All field operations will be performed in accordance with Washington Closure Hanford health and safety requirements, which are outlined in SH-1 and the requirements of the *Hanford Site Radiological Control Manual* (DOE-RL 1996).

Work planning, hazards analysis, and contingency planning will be conducted in accordance with the work control process as described in PAS-2, *Work Management*. The project work packages will include a job hazard analysis, site-specific health and safety plan, and applicable RWPs.

The sampling procedures and associated activities will consider exposure reduction and contamination control techniques that will minimize the radiation exposure to the sampling team, as required by QA-1 and SH-1.

6.0 REFERENCES

10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," *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.

BHI, 2002, *Environmental Restoration Disposal Facility Waste Acceptance Criteria*, BHI-00139, Rev. 4, Bechtel Hanford, Inc., Richland, Washington.

BSC-1, *Business Services and Communications*, Washington Closure Hanford, Richland, Washington.

BSC-300, *WCH Procurement*, Washington Closure Hanford, Richland, Washington.

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DOE-RL, 1998, *Hanford Analytical Services Quality Assurance Requirements Documents*, (HASQARD), DOE/RL-96-68, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2004, *Engineering Evaluation/Cost Analysis for the 100-K Area Ancillary Facilities*, DOE-/RL-2004-43, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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DOE-RL, 2006, *Engineering Evaluation/Cost Analysis for the 105-KE and 105-KW Reactor Facilities and Ancillary Facilities*, DOE/RL-2005-86, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington Sate Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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EPA, 1983, *Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-010, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd edition, July 1986, as revised through Update IIIB dated April 1998, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2000, *Guidance for the Data Quality Objectives Process*, EAP QA/G-4, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2001, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5, Interim Final, dated November 1999, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2002. *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5, U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C.

FH, 2005a, *Hanford Site Solid Waste Acceptance Criteria*, HNF-EP-0063, Rev. 12, Fluor Hanford Inc., Richland, Washington.

FH, 2005b, *Liquid Waste Processing Facilities Waste Acceptance Criteria*, HNF-3172, Rev. 3, Fluor Hanford, Inc., Richland, Washington.

Hanford Environmental Information System, Hanford Site database.

PAS-2, Work Management, Washington Closure Hanford, Richland, Washington.

QA-1, *Quality Assurance*, Washington Closure Hanford, Richland, Washington.

RC-200, *Radiological Control Field Procedures*, Washington Closure Hanford, Richland, Washington.

RC-300, *Radiological Control Instrumentation Procedures*, Washington Closure Hanford, Richland, Washington.

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

RFS, 1999, *Statement of Work for Environmental and Work Characterization Analytical Services*, RFSH-SOW-0003, Rev. 6, Rust Federal Services, Richland, Washington.

SH-1, *Safety and Health*, Washington Closure Hanford, Richland, Washington.

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

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

WCH, 2006, *DQO Summary Report for 105-KE and 105-KW Reactors and Ancillary Facilities Interim Safe Storage and D4 Project Waste Characterization*, WCH-103, Rev. 0, Washington Closure Hanford, Richland, Washington.

Waste Information Data System, Hanford Site database.

APPENDIX A

BUILDING DESCRIPTIONS

APPENDIX A
BUILDING DESCRIPTIONS

Table A-1. 105-KE Reactor Building.

Name	Reactor Building
Number	105-KE: WIDS # 100-K-42
Location	Central KE Area
Operational Years	1955 to 1971 (K Basin Closure Support)
Building Description	A concrete and structural steel multi-story structure having reinforced concrete or transite siding, precast reinforced concrete or insulating concrete roof with built-up asphalt and gravel surfacing. Dimensions: 5,457 m^2 (58,739 ft^2) total area.
Status/History	The building contains the reactor, control room, offices, conference room, lunchroom, change room, spent fuel storage areas, ventilation systems, and certain test facilities. Appurtenances: 91.5-m (300-ft) reinforced concrete exhaust stack (original height that was shorten about ½ height), railroad spur entering the building, 150-KE heat exchanger for utilizing reactor effluent water heat for space heating.
Characterization	Radiological contamination; unquantified hazardous construction materials.

Table A-2. 105-KE Water Tunnels.

Name	Water Tunnels
Number	105-KE
Location	South end of 105-KE
Operational Years	1955 to 1971 (K Basin Closure Support)
Building Description	Concrete raceway carrying pipes from the 190-KE Main Pump House Building to the 105-KE Reactor Building.
Status/History	
Characterization	Unquantified hazardous construction materials.

Table A-3. 105-KW Reactor Building.

Name	Reactor Building
Number	105-KW; WIDS # 100-K-3
Location	Central KW Area
Operational Years	1955-1970 (K Basin Closure Support)
Building Description	Almost identical to 105-KE. Differs somewhat in test facilities. A concrete and structural steel multi-story structure having reinforced concrete or transite siding, precast reinforced concrete or insulating concrete roof with built-up asphalt and gravel surfacing. Dimensions: 5,457 m^2 (58,739 ft^2) total area.
Status/History	The building contains the reactor, control room, offices, conference room, lunchroom, change room, spent fuel storage areas, ventilation systems, and certain test facilities. Appurtenances: 91.5-m (300-ft) reinforced concrete exhaust stack (original height that was shortened about ½ height), railroad spur entering the building, 150-KW heat exchanger for utilizing reactor effluent water heat for space heating.
Characterization	Radiological contamination; unquantified hazardous construction materials.

Table A-4. 105-KW Water Tunnels.

Name	Water Tunnels
Number	105-KW
Location	South end of 105-KW
Operational Years	1955-1970 (K Basin Closure Support)
Building Description	Concrete raceway carrying pipes from the 190 Main Pump House Building to the 105-KW Reactor Building.
Status/History	
Characterization	Unquantified hazardous construction materials.

Table A-5. 119-KE Exhaust Air Sample Building.

Name	Exhaust Air Sample Building
Number	119-KE
Location	Northeast end of 105-KE Reactor; southwest of 117-KE
Operational Years	1961 to 1971
Building Description	A small, pre-engineered, ribbed-metal building on a concrete slab foundation. The building is 84.7 m^2 (912 ft^2) (GE 1964).
Status/History	The 119-KE Exhaust Air Sample Building is located over the ventilation ducts that lead to the 117-KE Building. The building was designed to house most of the instrumentation for the exhaust air systems and is located over the vent ducts that lead from the filter buildings (PNL 1991).
Characterization	Potential radiological contamination; unquantified hazardous construction materials.

Table A-6. 142-K Cold Vacuum Drying Facility.

Name	Cold Vacuum Drying Facility (CVDF)
Number	142-K
Location	West of 190-KW
Operational Years	2001 to present
Building Description	A steel frame pre-cast concrete building within the 100-K fenced area. The building has two pre-engineered metal building wings/attachments, and is designed to house four process bays for dewatering and drying fuel in multi-canister overpacks shipped from the K Basins.
Status/History	Equipment that is installed and tested includes process equipment skids, hydrogen mitigation skids, waste water conditioning skid, distributive control system, personnel contamination monitors, helium storage tank, nitrogen storage tank, communications fiber and phone, high-efficiency filters, process and recirculation tanks, and stack monitoring system. This building is expected to be refurbished to treat and/or package (for shipment to other treatment facility) basin sludge for shipment from K Basins.
Characterization	Potential radiological contamination.

Table A-7. 142-KA Cold Vacuum Drying Facility Generator Building

Name	Cold Vacuum Drying Facility (CVDF) Generator Building
Number	142-KA
Location	West of 190-KW
Operational Years	2001 to present
Building Description	A steel building on a concrete slab and houses the CVDF generator.
Status/History	Currently in use.
Characterization	Potential radiological contamination.

Table A-8. 1506-K1 Fiber Optics Computer Hut.

Name	Fiber Optics Computer Hut
Number	1506-K1
Location	
Operational Years	1995 to present
Building Description	Connex box that contains the Lockheed Martin Services, Inc., Hanford Local Area Network terminal for the area computing needs.
Status/History	Currently in use.
Characterization	Potential radiological contamination.

Table A-9. 151-K Switching Station.

Name	Switching Station
Number	151-K
Location	
Operational Years	1955 to present
Building Description	
Status/History	Electrical power for the 100 Areas came from the Grand Coulee Dam to Bonneville Dam grid via the Midway Substation and the 151 Primary Substations. The offsite electrical power enters the site at the 151-KW substation at a voltage of 230 kV. The power is transformed to a voltage of 13.8 kV in the substation. The 13.8 kV is supplied to the 105-KE Basin through the cross-tie tunnel, and then transformed further at both the 105-KW and 105-KE Basins to K Basins utilization voltages of 4160 and 480 V for use in the 100-K Buildings. DOE-RL has operational requirements for this building past 2012.
Characterization	Unquantified hazardous construction material.

Table A-10. 151-KW Substation 230-KV.

Name	Substation 230-KV
Number	151-KW
Location	
Operational Years	1955 to present
Building Description	
Status/History	The offsite electrical power enters the site at the 151-KW substation at a Bonneville Power Administration (BPA) distribution voltage of 230 kV. The power is transformed to a voltage of 13.8 kV in the substation. The 13.9 kV is supplied to the 105-KE Basin through the cross-tie tunnel and then transformed further at both the 105-KW and 105-KE Basins to K Basins utilization voltages of 4160 and 480 V for use in the 100-K Buildings. DOE-RL has operational requirements for this facility past 2012.
Characterization	Unquantified hazardous construction material.

Table A-11. 151-KE Substation 230-KV.

Name	Substation 230-KV
Number	151-KE
Location	
Operational Years	1955 to present
Building Description	
Status/History	Electrical power for the 100 Areas came from the Grand Coulee Dam to Bonneville Dam grid via the Midway Substation and the 151 Primary Substations. The offsite electrical power enters the site at the 151-KW substation at a voltage of 230 kV. The power is transformed to a voltage of 13.8 kV in the substation. The 13.8 kV is supplied to the 105-KE Basin through the cross-tie tunnel and then transformed further at both the 105-KW and 105-KE Basins to K Basins utilization voltages of 4160 and 480 V for use in the 100-K Buildings. DOE-RL has operational requirements for this facility past 2012.
Characterization	Unquantified hazardous construction material.

Table A-12. 1604-K Process Building KR4.

Name	Process Building KR4
Number	1604-K
Location	
Operational Years	1993 to present
Building Description	A metal frame building with a cement floor that contains pumps and the resin column used to filter water from the groundwater pump-and-treat operations.
Status/History	DOE-RL has operational requirements for this building past 2012.
Characterization	Potential radiological and chemical contamination.

Table A-13. 1605-K Guard Towers and Fences.

Name	Guard Towers and Fences, including poles, lines, and above-grade utility piping
Number	1605-K
Location	
Operational Years	1955 to present
Building Description	The function of the fences and guard towers was to serve as part of the security system, to observe and guard the region and to prevent any unauthorized entries, and to watch for the outbreak of fires.
Status/History	Currently in use
Proximity to Other Buildings	
Characterization	Unquantified hazardous construction materials.

Table A-14. 1606-K Transfer Building KR-3.

Name	Transfer Building KR-3
Number	1606-K
Location	
Operational Years	1993 to present
Building Description	A metal frame building with a cement floor that houses pumps for the groundwater pump and treat operations.
Status/History	DOE-RL has operational requirements for this building past 2012.
Characterization	Potential radiological and chemical contamination.

Table A-15. 1607-K Transfer Building 1.

Name	Transfer Building 1
Number	1607-K
Location	
Operational Years	1993 to present
Building Description	A metal frame building with a cement floor that houses pumps for the groundwater pump-and-treat operations.
Status/History	DOE-RL has operational requirements for this building past 2012.
Characterization	Potential radiological and chemical contamination.

Table A-16. 165-KE Power Control Building.

Name	Power Control Building
Number	165-KE; WIDS # 100-K-67
Location	Northwest of 190-KE and east of 166-KE
Operational Years	1955 to present
Building Description	A single-story concrete structure with reinforced concrete floors, walls, and poured roof with built-up asphalt and gravel surfacing. The building consists of three parts: The pump room and valve pit with steel grating floor providing work area, the electrical area consisting of two concrete floors, the oil-fired steam plant; and control room. Dimensions: Approximately 4,910 m^2 (52,851 ft^2) of space.
Status/History	The purpose of the building was to provide housing for power house, control room, valve pit, and electrical switchgear for water supply system. Appurtenances: Adjacent 230 kV switchyard. Subsurface oil storage bunkers and oil pump facilities, 166-KE.
Characterization	Potential chemical contamination.

Table A-17. 165-KW Power Control Building.

Name	Power Control Building
Number	165-KW; WIDS # 100-K-66
Location	Northwest of 190-KW and east of 166-KW
Operational Years	1955-1971
Building Description	Identical to the 165-KE Building. A single-story concrete structure with reinforced concrete floors, walls, and poured roof with built-up asphalt and gravel surfacing. The building consists of three parts: The pump room and valve pit with steel grating floor providing work area, the electrical area consisting of two concrete floors, the oil-fired steam plant, and control room. Dimensions: Approximately 4,910 m^2 (52,851 ft^2) of area.
Status/History	The purpose of the building was to provide housing for powerhouse, control room, valve pit, and electrical switchgear for water supply system. Appurtenances: Adjacent 230 kV switchyard. Subsurface oil storage bunkers and oil pump facilities, 166-KE. The air compressors and receivers have been removed. Most of the asbestos lagging has been removed. Cleanup of the remaining asbestos and of asbestos already removed remains to be completed.
Characterization	Potential chemical contamination.

Table A-18. 166A-KE Oil Storage Facility Valvehouse.

Name	Oil Storage Facility Valvehouse
Number	166A-KE
Location	West of 165-KE
Operational Years	1955-1971
Building Description	Instrument shed for the 166-K oil bunker and equipment. The valvehouse house controlled steam heating, pumping, and monitored levels.
Status/History	
Characterization	Unquantified hazardous construction materials; potential chemical contamination.

Table A-19. 166A-KW Oil Storage Facility Valvehouse.

Name	Oil Storage Facility Valvehouse
Number	166A-KW
Location	West of 165-KW
Operational Years	1955-1970
Building Description	Small instrument and valve housed on top of the bunkers that controlled steam heating, pumping, and monitored levels.
Status/History	
Characterization	Unquantified hazardous construction materials; potential chemical contamination.

Table A-20. 167-K/167-KE Crosstie Tunnel Buildings.

Name	Crosstie Tunnel Building
Number	167-K/167-KE
Location	
Operational Years	1955-1971 (K Basin Closure Support)
Building Description	A concrete structure that is the midway ventilation and entry shaft for the 100-KE/KW crosstie tunnel 2.
Status/History	
Characterization	Potential chemical contamination.

Table A-21. 1705-KE Effluent Water Treatment Pilot Plant.

Name	Effluent Water Treatment Pilot Plant
Number	1705-KE
Location	Northwest of 165-KE
Operational Years	1955-1971
Building Description	A concrete block structure that is attached to 165-KE. It has approximately 51 m^2 (552 ft^2) of space and is in a deactivated status.
Status/History	
Characterization	Potential radiological and chemical contamination.

Table A-22. 1706-KE Water Studies Semi-Works Building.

Name	Water Studies Semi-Works Building
Number	1706-KE
Location	Southwest corner of the 105-KE Reactor
Operational Years	1955-1971 (K Basin Closure Support)
Building Description	The 1706-KE Building is a single-story concrete and steel frame structure with corrugated transite siding, concrete floors, and flat roof with built-up asphalt and gravel surfacing over cement board and 6.3-mm (0.25-in.) steel plate. It has a full basement with half sub-basement. The ground floor walls are concrete block and the upper levels are of transite siding. Dimensions: Approximate area of 1,042 m^2 (11,216 ft^2).
Status/History	Purpose is to provide out-of-reactor facilities in support of in-reactor test loops and single-pass tubes. It provides water treatment facilities and instrumented supply systems for eight KE Reactor tubes used for studies of corrosion and effects of water treatment parameters on effluent activity. One small room contains a treatment, storage, and disposal unit that is still active.
Characterization	Potential radiological and chemical contamination; unquantified hazardous construction materials.

Table A-23. 1706-KEL Development Laboratory.

Name	Development Laboratory
Number	1706-KEL
Location	Adjoins the 1706-KER Water Studies Recirculation Building
Operational Years	1955-1971 (K Basin Closure Support)
Building Description	A 251-m^2 (2,702-ft^2) building adjoining the 1706-KER Building.
Status/History	About half of this building is used for instrument development pertinent to water treatment and corrosion control. The remaining part is outfitted for handling corrosion coupons that may be mildly contaminated.
Characterization	Potential radiological and chemical contamination; unquantified hazardous construction materials.

Table A-24. 1706-KER Water Studies Recirculation Building.

Name	Water Studies Recirculation Building
Number	1706-KER
Location	Adjacent to the west wall of the 105-KE Reactor
Operational Years	1955-1971 (K Basin Closure Support)
Building Description	A single-story concrete and steel frame structure with approximately 1,075 m^2 (11,571 ft^2) of space. It has corrugated transite siding, concrete floors, and flat roof with built-up asphalt and gravel surfacing over cement board and 6.4-mm (0.25-in.) steel plate.
Status/History	The 1706-KER Building contains four shielded cells below grade, each housing the water treatment, heat exchange, pumping, and remote instrument equipment for each of the four in-reactor loops. These loops are capable of operation to 285° C (545 ° F) at 1600 psig. Loop materials are Zircaloy-2 and carbon steel or Zircaloy-2 and stainless steel with in-reactor portions to 6.8 cm (2.7 in.) inner diameter. Appurtenances: The 1706-KEL laboratory, a 251-m^2 (2,702-ft^2) building, adjoins the 1706-KER Building.
Characterization	Potential radiological and chemical contamination; unquantified hazardous construction materials.

Table A-25. 1713-KE Shop Building.

Name	Shop Building
Number	1713-KE
Location	Northwest corner of the 105-KE
Operational Years	1955 to present
Building Description	A sheet metal "butler" building with concrete floor and footings. 74 m^2 (797 ft^2)
Status/History	Used primarily for storage.
Characterization	Unquantified hazardous construction material.

Table A-26. 1713-KER Warehouse.

Name	Warehouse
Number	1713-KER
Location	West of the 105-KE
Operational Years	1955 to present
Building Description	Identical to 1713-KE, a sheet metal "butler" building with concrete floor and footings. 74 m^2 (797 ft^2)
Status/History	Primarily used for storage.
Characterization	Unquantified hazardous construction material.

Table A-27. 1713-KW Warehouse.

Name	Warehouse
Number	1713-KW
Location	Northeast of the 105-KW
Operational Years	1955 to present
Building Description	Identical to 1713-KE Building. A sheet metal "butler" building with concrete floor and footings. 74 m^2 (797 ft^2)
Status/History	Primarily used for storage.
Characterization	Unquantified hazardous construction material.

Table A-28. 1714-KE Oil and Paint Storage Shed.

Name	Oil and Paint Storage Shed
Number	1714-KE
Location	Northeast of the 105-KE
Operational Years	1955 to present
Building Description	An 18-m^2 (194-ft^2) sheet metal "butler" building on a concrete foundation. The building has been used for storage and as a work area.
Status/History	
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-29. 1714-KW Warehouse.

Name	Warehouse
Number	1714-KW
Location	Northeast of the 105-KW
Operational Years	1955 to present
Building Description	An 18-m^2 (194-ft^2) sheet metal "butler" building on a concrete foundation. The building has been used for electrical equipment storage.
Status/History	
Characterization	Unquantified hazardous construction material.

Table A-30. 1717A-KE Fan House.

Name	Fan House
Number	1717A-KE
Location	Adjacent to 1717-KE Maintenance shop
Operational Years	1955 to present
Building Description	Ventilation shed and is the structure that houses the fan for the 1717-KE Building. The fan house will be demolished in conjunction with 1717-KE.
Status/History	
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-31. 1717-K Maintenance/Transportation Shop

Name	Maintenance/Transportation Shop
Number	1717-K
Location	Midway between 100-KE and 100-KW Areas
Operational Years	1955 to present
Building Description	A single-story concrete and steel frame structure with corrugated transite siding, concrete foundation and floor, and flat prefabricated cement board roof with built-up asphalt and gravel surfacing. The building housed carpenter, millwright, welding, and painting shops for routine area maintenance as well as typical service station facilities and equipment for light automotive maintenance. Dimensions: 999 m^2 (10,753 ft^2) total area.
Status/History	Purpose was to house maintenance shops and light equipment maintenance facilities.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-32. 1724-K Maintenance Shop.

Name	Maintenance Shop
Number	1724-K
Location	South of 1717-K
Operational Years	1955 to present
Building Description	A single-story concrete and steel frame structure with corrugated steel siding, a concrete foundation and floor, and a sloped pre-fabricated metal roof. It has approximately 47 m^2 (506 ft^2) of space.
Status/History	This structure housed the repair and fabrication facilities for everyday repairs (nonproject size) needed in the 100-K Area.
Characterization	Unquantified hazardous construction material.

Table A-33. 1724-KA Equipment Shed.

Name	Equipment Shed
Number	1724-KA
Location	East of 1724-K
Operational Years	1955 to present
Building Description	A single-story concrete and steel frame structure with corrugated transite siding, a concrete foundation and floor, and a sloped pre-fabricated steel roof. It has approximately 19 m^2 (205 ft^2) of space.
Status/History	
Characterization	Unquantified hazardous construction material.

Table A-34. 1724-KB Gas Bottle Storage Building.

Name	Gas Bottle Storage Building
Number	1724-KB
Location	West of 166A-KE
Operational Years	1955 to present
Building Description	A single-story open-sided, concrete and steel frame structure with steel siding in places, a concrete foundation and floor, and a sloped pre-fabricated steel roof. It has approximately 19 m^2 (205 ft^2) of space.
Status/History	
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-35. 181-KE River Pump House.

Name	River Pump House
Number	181-KE
Location	On the shore of the Columbia River, northwest of 105-KE.
Operational Years	1955 to present
Building Description	An open air, reinforced concrete pad 415 m^2 (4,467 ft^2) at ground level with subsurface pump wells. Electrically driven deep well pumps are mounted on the pad and are controlled remotely from the 165-KE Building control room.
Status/History	Purpose was to provide facilities for transfer of water from Columbia River to the filter plant. Appurtenances: Small guard station mounted on top of 181-KE Building, 1605-KE Building.
Characterization	Unquantified hazardous construction material.

Table A-36. 181-KW River Pump House.

Name	River Pump House
Number	181-KW
Location	On the shore of the Columbia River, northwest of 105-KW
Operational Years	1955-1971
Building Description	Identical to 181-KE Building. An open air, reinforced concrete pad 415 m^2 (4,467 ft^2) at ground level with subsurface pump wells. Electrically driven deep well pumps are mounted on the pad and are controlled remotely from the 165-KE Building control room.
Status/History	Purpose was to provide facilities for transfer of water from Columbia River to the filter plant. Appurtenances: Small guard station mounted on top of 181-KE Building, 1605-KE Building.
Characterization	Unquantified hazardous construction material.

Table A-37. 183.1-KE Headhouse.

Name	Headhouse
Number	183.1-KE
Location	Next to the sedimentation basins at the southern end of the facility
Operational Years	1955 to present
Building Description	The headhouse is the water quality center for the water treatment plant and contained equipment for metering raw water; chemical injection into raw, filtered, and process water; and for effluent and influent control for the filter plant (AEC 1956). The headhouse has a concrete foundation and floor. It also contains structural-steel frame walls with transite siding and a transite roof with built-up asphalt and gravel (WHC 1988, UNI 1984). The building was constructed of 2,404 m^3 (3,143 yd^3) of concrete; 40,274 kg (88,789 lb) of miscellaneous iron; 44,635 kg (98,404 lb) of structural steel; 141,385 kg (311,701 lb) of reinforcing steel; 25.2 metric tons (27.8 tons) of miscellaneous steel; and 517 m^2 (5,565 ft^2) of siding (AEC 1956).
Status/History	Raw water from the 181-K Pumphouse entered the basement of the headhouse through two 152-cm (60-in.)-diameter pipelines. At the headhouse, the two lines branched into three 91-cm (36-in.)-diameter distribution lines (GE 1952). A single-story, T-shaped structure. The main wing contained the control equipment and personnel facilities, electrical equipment room, main control room, laboratory, lunchroom, locker and restroom, and chlorine equipment room. The remaining portion of the building housed the sanitary water filters, filter control board, water softeners, caustic soda and alum feeding pumps, activated silica batching and storage tanks, and silica batch control board. The basement of the main wing contained the raw water manifolds, metering stations, and the alum and activated silica injection points. The stem section of the basement contained the chemical heat exchangers, water glycol heat exchangers, circulating pumps, silica batching and storage tanks, and air compressors. The headhouse controlled the operations of the chlorination of raw water, addition of coagulants to raw water, pH correction of filtered water, addition of corrosion inhibitor to process water, and influent and effluent control (AEC 1956, WHC 1988). Appurtenances: 183.2-KE, 183.3-KE, 183.4-KE, 183.5-KE, and 183.6-KE.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-38. 183.2-KE Basins/Sedimentation.

Name	Basins/Sedimentation
Number	183.2-KE
Location	South of the 105-KE Reactor; north of 183.1-KE, north of 183-KE
Operational Years	1955 to present
Building Description	There are six parallel sedimentation basins. Water was fed from the flocculation basins into the sedimentation basins (GE 1952). The basins were constructed with 19,690 m^3 (25,753 yd^3) of concrete; 18,264 kg (40,266 lb) of miscellaneous iron; 1,328,610 kg (2,929,083 lb) of reinforcing steel; and 4,808.6 m (15,766 f) of pipe. The water-holding capacity of the sedimentation basins were 106,748,618 L (28,200,000 gal) (AEC 1956). The total area is 26,756 m^2 (288,000 ft^2) (UNI 1984). Flocculation and subsidence basins consisting of open air-reinforced concrete basins, mixing chambers, agitators, flumes, etc. Total area of this facility is about 26,756m^2 (288,000 ft^2).
Status/History	The 183.2-KE Flocculation and Sedimentation Basins were designed to provide through-mixing of chemicals that were added to the water in the 183.1-KE Headhouse, coagulation of particles of suspended matter, and settlement of suspended solids. The facility is capable of handling a maximum total water flow of 592,800 L/min (156,600 gal/min). From the headhouse, water entered the flocculation basins and directly into the sedimentation basins. Detention time for the flocculators was 29 minutes to allow for adequate coagulation. The sedimentation basins contained six individual sections, three on each side of a central tunnel, interconnected through two distribution flumes. In addition, each basin discharge flume is equipped with twenty 60-cm (24-in.) disc valves. Water flowed over a weir through the disc valves and into the filter distribution flume located under the discharge flume. At normal water flow, 24 cm (9.4 in.) of water flowed over the weir (GE 1952). Water entered the 183.3-KE Filter Plant from the sedimentation basins.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-39. 183.3-KE Basin/Filters.

Name	Basin/Filters
Number	183.3-KE
Location	North of the 183.2 Sedimentation Basins
Operational Years	1955 to present
Building Description	The filter basin is about 246 m (807 ft) wide, 24.6 m (81 ft) long, and 8.5 m (28 ft) high. The basin was constructed of 8,947 m^3 (11,702 yd^3) of concrete; 820,231 kg (1,808,300 lb) of reinforcing steel; 6,870 m (22,539 ft) of copper tubing; and 18,370 kg (40,498 lb) of miscellaneous steel (AEC 1956).
Status/History	The 183.3-KE Filter Basin was designed to remove unsettled flocculant and other small suspended particles carried by the water from the sedimentation basins. The filter building contained three sections: flumes, filters, and pipe gallery. The flumes are a vertical bank of concrete conduits located adjacent to, and paralleling, the entire width of the sedimentation basins. The filters are immediately beyond the flumes and contained two beds and a central gullet separating the beds. Water flowed from the flumes through a 152-cm and 182-cm (60-in. and 72-in.) filter sluice gate into each filter gullet. A pipe gallery ran the entire length of the filter, which included the central tunnel. Filtered water flowed from the filters, through the filter effluent flumes toward the outer ends of the flumes, and delivered to the clearwells (183.4-KE).
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-40. 183.4-KE Reservoir and Clearwells.

Name	Reservoir and Clearwells
Number	183.4-KE
Location	North of 183.3-KE, southeast of 166-KE
Operational Years	1955 to present
Building Description	The clearwell perimeter walls, floors, columns, beams, and struts were constructed of reinforced concrete. The roof deck was constructed of a pre-cast, reinforced-concrete slab covered with a 4-ply asphalt and gravel. The overall dimensions, which included the central pipe tunnel, are 246 m (807 ft) long by 47 m (154 ft) wide and 7 m (23 ft) deep. Each clearwell is 119 m (390 ft) long, 47 m (154 ft) wide, and 7 m (23 ft) deep. It was constructed of 19,990 m^2 (215,170 ft^2) of concrete; 664 metric tons (732 tons) of reinforcing steel; 19 metric tons (21 tons) of miscellaneous steel; 1,182.5 squares of roofing; 519 m (1,703 ft) of copper tubing; and 1,974 m (6,476 ft) of pipe (AEC 1956).
Status/History	The 183.4-KE Clearwells were designed to provide underground storage of filtered water. The two clearwells are each capable of holding 34,068,708 L (9,000,000 gal) of water (UNI 1984). A pipe tunnel divides the two reservoirs on the centerline. A gravity pipe connection is located between the bottoms of the two halves of the reservoir. The pipe is located under the tunnel, with an overflow line from each reservoir connected to the main sewer.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-41. 183.5-KE Lime Feeder Building.

Name	Lime Feeder Building
Number	183.5-KE
Location	Southwest corner of the 183.4-KE Clearwells
Operational Years	1955 to present
Building Description	The lime feeder building is located above the flash mixers. Differences exist in the size of the building. One document says that it is 21 m^2 (225 ft^2) (GE 1964), and another document states it is 86 m^2 (925 ft^2) (UNI 1984). Construction drawing H-1-25108 indicates the building was 11 x 8.1 x 5.1 m (36 x 27 x 17 ft).
Status/History	The lime feeder building was designed to discharge lime through a pair of flash mixers to the clearwells. Lime was added to the water to obtain the proper pH. The lime building contained an automatic, dry, gravimetric belt-type feeder with a capacity of 227 kg/hr (500 lb/hr); hopper, weir box, and lime feeder. Lime was stored in a steel silo with a storage capacity of 113 metric tons (125 tons) (AEC 1956). Lime was delivered to the silos by railcars.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-42. 183.6-KE Lime Feeder Building.

Name	Lime Feeder Building
Number	183.6-KE
Location	Southeast corner of the 183.4-KE Clearwells
Operational Years	1955 to present
Building Description	The lime feeder building is located above the flash mixers. Differences exist in the size of the building. One document says that it is 21 m^2 (225 ft^2) (GE 1964), and another document states it is 86 m^2 (925 ft^2) (UNI 1984).
Status/History	The lime feeder building was designed to discharge lime through a pair of flash mixers to the clearwells. Lime was added to the water to obtain the proper pH. The lime building contained an automatic, dry, gravimetric belt-type feeder with a capacity of 227 kg/hr (500 lb/hr); hopper, weir box, and lime feeder. Lime was stored in a steel silo with a storage capacity of 113 metric tons (125 tons) (AEC 1956). Lime was delivered to the silos by railcars.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-43. 183-K Pipe Tunnel.

Name	Pipe Tunnel
Number	183-K (also known as 183.7-KE)
Location	Under the 183-KE Water Treatment Facility
Operational Years	1955 to present
Building Description	The pipe tunnel extended from the 183.1-KE Headhouse, under the center of the sedimentation basin, the clearwell fuel storage area, the 190-KE Building, and the 165-KE Building to the 105-KE (AEC 1956, drawing SK-1-23727). The tunnel contains two 152-cm (60-in.) raw water lines, a 76-cm (30-in.) sewer line, and an elevated walkway.
Status/History	The 183-K Pipe Tunnels are below-grade tunnels housing the pipelines that carried effluent water from the 183-KE and 183-KW Filter Plants to the 190-KE and 190-KW Process Water Pump House Buildings. The tunnels contain metal walkways and the piping associated with the water delivery system between the filter plants and the pump houses. This tunnel is also known as the 183.7-KE Pipe Tunnel.
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-44. 183-KE Chlorine Vault.

Name	Chlorine Vault
Number	183-KE
Location	Next to the 183.1-KE Headhouse
Operational Years	1955 to present
Building Description	The 183-KE Chlorine Car Protection Building contained two bays, with a railroad spur at each bay (WHC 1988). The entry doors are metal and bomb resistant.
Status/History	The completion report states that chlorine was stored and used directly from railroad tank cars, and air pressure was used for unloading. Chlorine was fed from the railcars to evaporators that vaporized it to a gaseous state. From the evaporators, the chlorine passed to a visible vacuum-type chlorinator that controlled the injection rate in proportion to raw water flow. The injection of chlorine is blended with raw water to form a chlorine solution. Three evaporators and three chlorinators were used, two for active use and one for standby (AEC 1956).
Characterization	Unquantified hazardous construction material; potential chemical contamination.

Table A-45. 185-K Potable Water Treatment Plant.

Name	Potable Water Treatment Plant
Number	185-K
Location	Adjacent to 183.1-KE
Operational Years	1991 to present
Building Description	Self-contained packaged water treatment subsystem capable of providing up to 380 L/min (100 gal/min) of potable water. Most of this facility is located within a pre-engineered metal building.
Status/History	The system is designed for a continuous supply of 190 L/min (50 gal/min) from each of two package water treatment units. The package units use upflow clarifiers and polishing filters to remove particulate from the water. A packaged duplex pump station delivers raw water from sedimentation basin No. 4 to the treatment plant via a 10-cm (4-in.) PVC pipe in the tunnel and the 183.1-KE basement. A coagulant is injected at the influent of the upflow clarifiers. A filter aid (polymer) can be injected to combine the smaller particles into filterable solids. Chemical addition is controlled by the plant's PLC, which monitors influent and effluent turbidity and adjusts the chemical injection rate accordingly.
Characterization	Potential chemical contamination.

Table A-46. 1908-KE Effluent Water Monitoring Station.

Name	Effluent Water Monitoring Station
Number	1908-KE
Location	Northwest of 105-KE
Operational Years	1955-1971
Building Description	A 13-m^2 (140-ft^2) building of corrugated transite.
Status/History	This was used as an iodine monitoring facility. It contains instruments and sampling systems for recording flow, temperature, and collecting samples at the 004 river outfall.
Characterization	Potential radiological contamination; unquantified hazardous construction materials.

Table A-47. 190-KE Main Pump House.

Name	Main Pump House
Number	190-KE
Location	Over the central tunnel between the 165-KE Control Building and 183.4-KE Clearwells
Operational Years	1955 to 1971
Building Description	The building housed all large water pumping units. The superstructure was constructed of a steel frame and transite siding. The substructure was constructed of reinforced concrete. The following materials were used for the construction of the building: 4,869 m^3 (6,368 yd^3) of concrete; 42 metric tons (46 tons) of miscellaneous steel; 378 metric tons (416 tons) of reinforcing steel; 267 metric tons (294 tons) of structural steel; 1,508 m^2 (16,232 ft^2) of roofing; 3,749 m (12,300 ft) of siding; 3,749 m (12,300 ft) of pipe; and 1,532 m (5,026 ft) of copper tubing (AEC-GE 1964, AEC 1956, WHC 1994). The building is 4,425 m^2 (47,630 ft^2) (UNI 1984).
Status/History	The 190-KE Process Water Pump house is a single-story building with a basement that was designed to house all large water pumping units, which included service and backwash pumps. The pump house developed the pressure necessary to pump treated water to the reactor for cooling (GE 1952). The building contained six dual-pumping sets of process pumps designed to provide a positive suction head to the secondary pump and also furnish water during transient shutdown. In addition, it contained primary and secondary pumps (GE 1952).
Characterization	Unquantified hazardous construction materials; potential chemical contamination.

Table A-48. 296K105 Air Sparging Vent 105-KW Basin.

Name	Air Sparging Vent 105-KW Basin
Number	296K105
Location	Adjacent to 105-KW
Operational Years	1992 to present
Building Description	A 5-cm (2-in.) pipe used to vent air when sparging the basin sand filters. The pipe will be demolished in conjunction with the 105-KW Building.
Status/History	
Characterization	Potential radiological contamination.

Table A-49. 296K142 Cold Vacuum Drying Facility (CVDF) Main Stack.

Name	CVDF Main Stack
Number	296K142
Location	West of 190-KW
Operational Years	2001 to present
Building Description	Approximately 61-cm (24-in.)-diameter, 12-m (39-ft)-tall steel stack that exhausts filtered ventilation and process air from the CVDF.
Status/History	
Characterization	Potential radiological contamination.

Table A-50. Cargo Containers.

Name	Cargo Containers
Number	CC1K0035, CC1K0036, CC1K0037, CC1K0176, CC1K0177, CC1K0178, CC1K0179, CC1K0180, CC1K0181, CC1K0182, CC1K0236
Location	Various
Operational Years	Varies (K Basin Closure Support)
Building Description	Connex boxes in and around the original reactor building and fuel storage basin facilities used for storage during basin remediation work. These are generally 2.4 to 3.1 m (7.9 to 10ft) wide and up to 12 m (39 ft) long.
Status/History	
Characterization	Potential radiological contamination; unquantified hazardous construction materials.

Table A-51. Storage Containers.

Name	Storage Containers
Number	HS0028, HS0080, HS0081
Location	
Operational Years	1998 to present
Building Description	Hazardous waste storage units are purpose built, pre-fabricated units that have been installed to support basin remediation work.
Status/History	
Characterization	Potential chemical contamination.

Table A-52. KA-CW-01 CERCLA Storage Unit.

Name	CERCLA Storage Unit
Number	KA-CW-01
Location	
Operational Years	1998 to present
Building Description	393-m^2 (4,230-ft^2) storage pad
Status/History	This is a hazardous waste storage pad that was installed to support basin remediation work.
Characterization	Potential chemical contamination.

Table A-53. Mobile Offices.

Name	Mobile Offices
Number	MO-048, MO-054, MO-060, MO-101, MO-102, MO-236, MO-237, MO-293, MO-323, MO-382, MO-401, MO-402, MO-442, MO-495, MO-500, MO-506, MO-507, MO-907, MO-917, MO-928, MO-955, MO-969
Location	Various
Operational Years	Varies (K Basin Closure Support)
Building Description	Mobile office units are generally from 12 m to 18 m (39 ft to 59 ft) long. These are generally 3.6 m to 4.3 m (12 ft to 14 ft) wide units that may be linked to form 2 wide up to 16 wide complexes.
Status/History	These mobile offices are placed around the original reactor building and fuel storage basin facilities and are used for engineering, administration, management, lab, and craft support during remediation work. Some units were purchased new and have been at 100-K Area for 10 to 15 years. Other units have a long Hanford Site history and have been brought to the 100-K Area within the last 10 to 15 years.
Characterization	Potential radiological contamination; unquantified hazardous construction materials.

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