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Facility Effluent Monitoring Plan for the Spent Nuclear Project

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

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

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Facility Effluent Monitoring Plan for the Spent Nuclear Project

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**FACILITY EFFLUENT MONITORING PLAN FOR THE
SPENT NUCLEAR FUEL PROJECT**

ABSTRACT

A facility effluent monitoring plan is required by the U.S. Department of Energy in DOE Order 5400.1¹ for any operations that involve hazardous materials and radioactive substances that could impact employee or public safety or the environment. This document was prepared using the specific guidelines identified in Westinghouse Hanford Company (WHC)-EP-0438-1², A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans, and assesses effluent monitoring systems and evaluates whether they are adequate to ensure the public health and safety as specified in applicable federal, state, and local requirements.

This facility effluent monitoring plan is the third revision to the original annual report. This document is reviewed annually even if there are no operational changes, and it is updated as necessary.

¹ General Environmental Protection Program, DOE Order 5400.1, U. S. Department, Washington, D.C., 1991.

² A Guide to Preparing Hanford Site Facility Effluent Monitoring Plans, WHC-EP-0438-1, Westinghouse Hanford Company, Richland, Washington.

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LIST OF TERMS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CAM	continuous air monitor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
cfm	cubic feet per minute
cm	centimeter
CSB	Canister Storage Building
CVDF	Cold Vacuum Drying Facility
DOE	U.S. Department of Energy
DOH	Department of Health
DOP	diethyl phthalate (test)
Ecology	State of Washington Department of Ecology
EDE	effective dose equivalent
EPA	U.S. Environmental Protection Agency
FEMP	Facility Effluent Monitoring Plan
FFTF	Fast Flux Test Facility
FH	Fluor Hanford
ft	feet
ft ³ /min	cubic feet per minute
HEPA	high-efficiency particulate air
in.	inch
ISA	Interim Storage Area
IWTS	Integrated Water Treatment System
K Area	K Area Spent Fuel Storage Basin
KE	K East storage basin
KW	K West storage basin
LLBF	low level burial grounds
MCO	multi-canister overpacks
min	minute
m ³ /min	cubic meters per minute
MSGP	Multi-Sector General Permit
NDA	non destructive assay
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFM	near-facility monitoring
NOC	notice of construction
NOI	notice of intent
NPDES	National Pollutant Discharge Elimination System

List of Terms (cont)

Pacific Northwest	Pacific Northwest National Laboratories
PCB	Polychlorinated Biphenyls
PFP	Plutonium Finishing Plant
QA	quality assurance
RCRA	Resource Conservation and Recovery Act of 1976
SNF	Spent Nuclear Fuel
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company
WSCF	Waste Sampling and Characterization Facility

1.0 SPENT NUCLEAR FUEL PROJECT

1.1 INTRODUCTION

This section describes the purpose and scope of the Spent Nuclear Fuel (SNF) Project Facility Effluent Monitoring Plan (FEMP).

1.1.1 Purpose

The purpose of this FEMP is to describe the rationale and design criteria for the effluent monitoring program at the facility, information on the extent and frequency of monitoring and measurements, procedures for laboratory analyses, quality assurance requirements and program implementation procedures. This FEMP encompasses all SNF Project facilities, i.e.:

- K East (KE) Basin
- K West (KW) Basin
- 100 K Balance of Plant
- Cold Vacuum Drying Facility (CVDF)
- Canister Storage Building (CSB)
- 200 Area Interim Storage Area (ISA).

1.1.2 Scope

The scope of this document includes radioactive and nonradioactive effluents discharged from SNF Project facilities. Effluents in the broader sense means liquid effluents and airborne emissions which are discharged to the environs. This FEMP includes documentation for both airborne and liquid effluent monitoring systems that monitor radioactive and nonradioactive effluents that could be discharged to the environment under routine and/or unplanned operating conditions.

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2.0 FACILITY DESCRIPTION

The Hanford SNF Project has been established to manage the safe storage of SNF at the Hanford Site in anticipation of future final disposition. The scope of the SNF Project covers the maintenance and preparation of the K Basins for removal and safe storage of the SNF, debris, sludge, and water, as necessary, and operation of new systems and facilities to condition and store the fuel prior to final disposition; relocation of the K Basin SNF (via the multi-canister overpack (MCO) and cask/transportation system) to the interim storage facility; removal and pretreatment of the K Basin sludge for disposal; consolidation of the SNF from other Hanford locations (except the Low Level Burial Facility [LLBF] and Plutonium Finishing Plant [PFP] SNF inventories) at the 200 East ISA; and deactivation of the 100 K Area facilities (includes basin water removal) that are under the purview of the SNF Project for eventual decontamination and decommissioning by the Environmental Restoration Program (HNF-3552). See Figure 2-1 for a pictorial of the SNF Project process.

Figure 2-1. Spent Nuclear Fuel Project Process.

2.1 FACILITY PHYSICAL DESCRIPTION

This FEMP covers the facilities that support the SNF Project process and their effluent streams to the environment. Table 2-1 lists these facilities/operations and their type(s) of potential effluent discharges.

Table 2-1. Spent Nuclear Fuel Project Facility Potential Effluent Discharges.

Facilities	Air		Water	
	Rad	Non Rad	Rad	Non Rad
105 KE Spent Fuel Storage Basin	X			
105 KW Spent Fuel Storage Basin	X			
CVDF	X	X		
1706 KE Complex	X			
1724 K Maintenance Shop		X		
1908 K Outfall National Pollutant Discharge Elimination System (NPDES) 004 Outfall			X (A)	X
1908 K Outfall (NPDES) Multi Sector General Permit (MSGP) (stormwater)			X (A)	X
181 KE Outfall 003 NPDES				X
CSB	X			
200 Area, ISA (no discharges)				
100 K Area Balance of Plant				
• Sanitary Waste Discharges				X
• Groundwater Discharges under ST-4508, 4509, 4510				X

Note (A) Past reactor operations

2.1.1 Fuel Storage Basins Physical Description (105 K East/K West)

The 105 KE and 105 KW Fuel Storage Basins are in most respects identical. Since their construction, minor modifications have resulted in slight differences. The basins are both constructed of reinforced concrete. They are rectangular, 38 meters (m) (125 feet [ft]) long by 20 m (67 ft) wide by 6.4 m (21 ft) deep. The pools are divided into three sections by concrete walls that are open at each end. Water is maintained in each basin to a depth ranging from 4.6 m (15 ft 4 inch [in.]) to 5 m (16 ft 8 in.) The bottoms of the pools are approximately 6 m (20 ft) below grade. Each basin was modified to include a recirculation system for the basin water including cartridge filters, an ion exchange system, a sand filter system, heat exchanger, and

instrumentation to monitor radiation levels, temperature, and basin water level. Both basins have racks installed for storing the N Reactor fuel canisters. Radioactively contaminated or potentially radioactively contaminated building service drains within the facilities have been intercepted and routed to building sumps. Unused drains have been plugged and sealed with concrete. The 105 KW Basin floor and walls were coated with a pliable epoxy sealant, and only encapsulated fuel canisters are stored in that basin.

2.1.2 1706 K East Office Complex Physical Description

The 1706 KE office complex consists of the following buildings.

- 1706 KE: Office space
- 1706 KEL: Office space
- 1706 KER: Storage.

The 1706 KE and 1706 KER Buildings were constructed in 1954 as part of the 100 K Reactor. The original mission of these facilities was to conduct prototype studies on reactor coolant recirculation cooling systems that were tied to the KE Reactor core.

The main floor (0-ft level) of the 1706 KE Building contains office space, store rooms, lunch room, locker room, and a counting laboratory. The counting laboratory is the only active source of potential radiological releases at the 1706KE office complex.

2.1.3 Cold Vacuum Drying Facility Physical Description

The CVDF mission is to remove free water from metallic uranium SNF and to prepare SNF for storage in an inert atmosphere (helium). The SNF will be packaged into water-filled MCOs and removed from the 100 K Area KE and KW fuel storage basins. Removal of free water is necessary to halt water-induced corrosion of exposed uranium surfaces and to allow the MCOs to be safely transported to the Hanford Site 200 East Area and stored within the SNF Project CSB.

The CVDF is located within a few hundred meters of the 100 K Area fuel storage basins just southwest of the 165 KW Power Control Building and the 105 KW Reactor Building. The CVDF site is in close proximity to all of the required utilities and is within the 100 K Area inner security boundary. The site area required for the facility and vehicle access is approximately 2.0 acres. Access is provided by the main entrance to the 100 K Area using existing roadways.

2.1.4 1724 Maintenance Shop Physical Description

The shop consists of a single story metal utility building (the 1724 K Building) and its installed equipment. The building is approximately 50 ft X 100 ft (5,000 ft²). The building is equipped with a ventilation system for comfort heating and cooling.

The shop is a non-nuclear facility that is being used for routine maintenance and repair work in support of continued operations of various facilities at 100 K including the future operations involving the removal of SNF from the basins. Shop equipment and activities that will potentially generate toxic air pollutants include:

- Currently unused, the spray paint booth is equipped with an 8,000 ft³/min filtered exhaust fan that vents outside the building. The exhaust system will be equipped with an activated charcoal filter to control emissions of volatile organic compounds if the booth is used. As of August 2000, the construction of this system is incomplete (i.e. charcoal filters are not installed).
- Abrasive blasting in an enclosure equipped with a 405 ft³/min ventilation system using cloth bag filters. The unit will exhaust into the shop air space.
- Woodworking equipment such as bandsaw and belt sander, that will be connected to a 2,600 ft³/min sawdust collection system consisting of a fan, cyclone separator, and cloth bag filter that will vent outside the building.
- Arc welding with a portable welding fume collector and ventilator using a two stage electrostatic precipitator to remove particulates. The collector will exhaust into the shop space.
- Benchtop grinding and sanding.
- Benchtop soldering and brazing.

2.1.5 1908 K East Outfall Physical Description (National Pollutant Discharge Elimination System Permit No. WA002591-7)

The primary liquid effluent discharge point at the 100 K Area is the 1908 KE Outfall. The outfall itself is a pair of 84-in.-diameter pipes that extend from the 1908 KE Building (approximately 750 ft from the river) and discharges beneath the surface of the Columbia River one-third of the way across the river. The outfall itself is covered in rip-rap (large stones) to strengthen the outfall pipe and protect the pipes from the effects of the current.

2.1.6 1908 K East Outfall Physical Description for Storm Water (Multi- Sector General Permit)

Storm water runoff is collected by drains and routed to underground piping and discharged at the 1908 KE Outfall.

2.1.7 181 KE Outfall Physical Description (National Pollutant Discharge Elimination System Permit No. WA002591-7 Not Operational)

The 181 KE Outfall is located adjacent to the 181 KE Building. The outfall is designed to discharge the traveling filter screen backwash water, but is currently unused. The outfall is a 12-in. diameter pipe. It travels downward from the filter screens into the ground just east of the 181 KE Building. The pipe then bends toward the middle of the Columbia River. The discharge is approximately 575 ft toward the center of the channel from the 181 KE Building. The traveling filter screen is used infrequently. The inlet to the discharge pipe at the 181 KE Building has been plugged. When the screen is backwashed, the accumulated backwash water is

trucked to a settling basin at 183 KE. No discharge occurs to the Columbia River at present.

2.1.8 Spent Nuclear Fuel Project Facilities Groundwater Discharges Physical Description

The SNF Project facilities that discharge to ground are covered under the State Waste Discharge Permits ST 4508/ ST 4509/ ST 4510. The discharges covered are: hydrotesting, construction, dust control, and storm water.

2.1.9 Sanitary Sewage Discharge Physical Description

Sanitary waste from SNF Project facilities is either discharged to ground by septic field or discharged to a holding tank for disposal by septic pumping truck.

2.1.10 Canister Storage Building Physical Description

The CSB consists of a structural steel above grade structure with metal siding, which encloses the load-in/load-out area, and three equally sized below-grade concrete vaults covered by a concrete operating deck. Support functions and equipment are housed in a steel supporting building located at the north side of the operations building. Only the northernmost vault is equipped with steel tubes for staging and storage of the MCOs. The storage tubes are supported from the foundation base slab of the vault and are accessed through tube plugs in the operating deck. The MCO storage vault is cooled by natural convention through the above-grade, dedicated concrete and steel inlet structure and exhaust air stack and below-grade reinforced concrete plenum.

2.1.11 200 Area Interim Storage Area Physical Description

The 200 Area ISA consists of concrete pads, perimeter fencing and access for transporters and mobile cranes, and conduit for potential future electrical service and instrumentation. The 200 Area ISA is situated within the CSB site. This site is not a radiological area. The 200 Area ISA is to provide a secure site for the storage of non-defense production reactor spent nuclear fuel in dry cask storage systems.

2.2 FACILITY PROCESS DESCRIPTION

2.2.1 Fuel Storage Basins Process Description (105 K East/K West)

The 105 KE Basin currently contains 3,668 open-top canisters, filled primarily with N Reactor fuel, and two baskets (the equivalent of five canisters) filled with aluminum-clad fuel assemblies from the retired single-pass reactors. However, because the primary barrier (cladding) of the stored fuel has been breached, fission products have escaped from these fuel assemblies, contaminating the basin cooling water.

The 105 KW Basin contains 3,821 sealed (MK I and II) canisters filled with N Reactor fuel. The MK I and II canisters provide a barrier to limit the release of fission products from the damaged fuel assemblies, and the basin cooling water provides a secondary barrier to the potential release of radioactive materials to the environment.

Water levels are maintained in each basin at a sufficient depth above the irradiated fuel to cool the fuel and provide radiological shielding for personnel working in the facility. Filters and ion exchange systems maintain basin water clarity and remove radionuclides.

Some of the SNF stored in the K Basins exists in a degraded state and continues to corrode from reaction with the basin water. This corrosion results in sludge that will be removed when the fuel elements are placed in the MCOs for processing at CVDF and stored at CSB.

Each basin contains approximately 1.2 million gallons of water that provides radiation shielding, cools the fuel and restricts the release of non-volatile radionuclides. This water will eventually be removed after the removal of fuel and sludge is complete. This water will be transferred to the Effluent Treatment Facility for treatment and disposal.

2.2.2 1706 KE Office Complex Process Description

1706 KE office complex facility was originally designed as a testing complex. This laboratory functioned as a development laboratory, and most recently is being used for office space and a radioactive counting laboratory.

2.2.3 Cold Vacuum Drying Facility Process Description

The CVDF provides the facility and process required to drain the water and dry the SNF filled MCOs after they have been removed from the K Basins. Removal of free water, using a cold vacuum drying process, from the MCOs will prevent MCO overpressurization during the projected storage period at the CSB.

2.2.4 1724 K Maintenance Facility Process Description

The shop is a non-nuclear facility that is used for maintenance and repair work that includes: painting, abrasive blasting, working cutting with woodworking tools such as a bandsaw/belt sander, arc welding, bench top grinding, and benchtop soldering/brazing. The paint booth is not currently in service since its exhaust is not equipped with a charcoal filter and other considerations.

Because this is a maintenance shop rather than a manufacturing facility, the equipment is not used continuously nor will the emissions be continuous.

2.2.5 1908 KE Outfall Process Description (National Pollutant Discharge Elimination System Permit NO. WA002591-7 Outfall 004)

The 1908 KE Outfall 004 is the only actively-permitted liquid effluent discharge point at 100K

Area. This Outfall collects water from several sources which is then discharged at the 1908 KE Outfall.

2.2.6 1908 K East Outfall Process Description for Storm Water (Multi-Sector General Permit)

Storm water is collected from areas adjacent to the 105 KE/KW facilities. The effluent is then collected in the discharge pipe and discharges out the 1908 KE Outfall 004.

2.2.7 181 KE Outfall Process Description (National Pollutant Discharge Elimination System Permit No. WA002591-7 Outfall 003)

This outfall is permitted for the backwashing of the debris on the traveling filter screens at the river water intake. No discharges take place at this Outfall.

2.2.8 Spent Nuclear Fuel Project Facilities Groundwater Discharges Process Description

The Hanford Site has three State Waste Discharge Permits (ST 4508, ST 4509, ST 4510). The SNF Project facilities must comply with the discharge limits to protect the groundwater. There are no dedicated discharge structures at SNF Project facilities for soil column discharges under the above permits..

2.2.9 Sanitary Sewage Discharge Process Description

Sanitary sewage from office trailers, maintenance shops, offices, and etc. are processed as follows: (1) Collected in holding tanks, pumped to tanker trucks, and discharged to a sanitary facility (i.e. N Reactor sewage lagoon); or (2) Discharged to ground by septic field.

2.2.10 Canister Storage Building Process

The MCO is transported from the CVDF to the CSB, in a closed transfer cask. At the CSB, the MCOs will be either placed directly into a storage tube or placed in the MCO weld station where a cover cap will be welded over the shield plug to provide a complete welded closure. For those MCOs placed directly into the storage tubes upon receipt at the CSB, they will be reoved later for welding their cover cap on. The sealed MCOs are then moved to the CSB storage tubes and stacked two per tube, with an impact absorber between them, for the interim storage period. Six MCOs will be stored with only the mechanical seal for the first few years to allow sample monitoring of pressure, temperature, and gas composition. All MCOs can be monitored for pressure throughout the entire storage period at the CSB.

2.2.11 200 Area Interim Storage Area

The 200 Area ISA is located adjacent to the CSB and is used for outdoor dry storage of certain types of SNF, e.g. Fast Flux Test Facility (FFTF) SNF, Neutron Radiography Facility SNF and

300 Area light water reactor SNF. The cask storage systems used for these fuel types will not involve any effluents (i.e. airborne or liquid). The 200 Area ISA is not intended to produce effluent but is included here to provide a complete description of major SNF facilities.

2.3 IDENTIFICATION AND CHARACTERIZATION OF INVENTORY

2.3.1 Spent Nuclear Fuel Project Radionuclide Inventory

The radionuclide inventory currently managed by the SNF Project is contained in the 105 KE and 105 KW fuel storage basins. This inventory will be processed through the CVDF and then stored at CSB. Table 2-2 lists the combined radionuclide inventory for 105K Basins.

The radionuclide inventory associated with the SNF that is currently managed at non-SNF Project facilities is described in WHC-SD-SNF-TA-010, Rev. 0, "Evaluation of Other Spent Nuclear Fuel Management at the Canister Storage Building Complex." This material is planned to be transferred to either the CSB or 200 Areas ISA for storage.

2.3.2 Nonradioactive Chemical Inventories

The nonradioactive chemical inventories currently stored at the facilities listed in Section 2.2 are annually inventoried and reported by the Emergency Planning and Community Right-to-Know Act. From the current reports and projected chemicals to be used in the SNF Project facilities, it has been determined that none of the chemicals are routinely present in facility effluent streams during normal operation. Therefore only radiological releases will be discussed in detail in this FEMP.

Table 2-2. Combined 105 K Basins Fuel Radionuclide Inventory Decayed to May 31, 1998.

Radionuclide	K Basins Inventory (Ci)	Radionuclide	K Basins Inventory (Ci)	Radionuclide	K Basins Inventory (Ci)
³ H	3.66E+04	^{126m} Sb	1.56E+02	²³⁷ Np	5.72E+01
¹⁴ C	6.93E+02	^{123m} Te	2.76E-11	²³⁸ Pu	1.11E+05
⁵⁵ Fe	1.84E+03	^{125m} Te	8.18E+03	²³⁹ Pu	2.18E+05
⁶⁰ Co	3.96E+03	¹²⁷ Te	9.49E-07	²⁴⁰ Pu	1.19E+05
⁵⁹ Ni	4.10E+01	^{127m} Te	9.69E-07	²⁴¹ Pu	6.68E+06
⁶³ Ni	4.49E+03	¹²⁹ Te	0.00E+01	²⁴² Pu	5.49E+01
⁷⁹ Se	8.62E+01	^{129m} Te	0.00E+01	²⁴¹ AmI	3.75E+05
⁸⁵ Kr	5.90E+05	¹²⁹ I	6.37E-00	²⁴² Am	1.95E+02
⁸⁹ Sr	0.00E+01	¹³⁴ Cs	1.59E+04	^{242m} Am	1.96E+02
⁹⁰ Sr	1.01E+07	¹³⁵ Cs	7.75E+01	²⁴³ Am	1.20E+02
⁹⁰ Y	1.01E+07	¹³⁷ Cs	1.32E+07	²⁴² Cm2	1.62E+02
⁹¹ Y	2.23E-14	^{137m} Bs	1.25E+07	²⁴⁴ Cm	1.44E+03
⁹³ Zr	4.00E+02	¹⁴¹ Ce	0.00E+01		
⁹⁵ Zr	1.69E-12	¹⁴⁴ Ce	9.14E+02		
^{93m} Nb	2.47E+02	¹⁴³ Pr	0.00E+01		
⁹⁵ Nb	3.74E-12	¹⁴⁴ Pr	9.03E+02		
^{95m} Nb	1.25E-14	^{144m} Pr	1.10E+01		
⁹⁹ Tc	2.88E+03	¹⁴⁷ Pm	4.62E+05		
¹⁰³ Ru	0.00E+01	¹⁴⁸ Pm	0.00E+01		
¹⁰⁶ Ru	1.82E+03	^{148m} Pm	0.00E+01		
^{103m} Rh	0.00E+01	¹⁵¹ Sm	1.76E+05		
¹⁰⁶ Rh	1.82E+03	¹⁵² Eu	9.45E+02		
¹⁰⁷ Pd	1.63E+01	¹⁵⁴ Eu	1.07E+05		
¹¹⁰ Ag	2.84E-04	¹⁵⁵ Eu	2.21E+04		
^{110m} Ag	2.14E-02	¹⁵³ Gd	1.28E-04		
^{113m} Cd	3.55E+03	¹⁶⁰ Tb	2.77E-15		
^{115m} Cd	0.00E+01	²³⁴ U	8.74E+02		
^{113m} In	2.14E-07	²³⁵ U	3.37E+01		
¹¹³ Sn	2.14E-07	²³⁶ U	1.27E+02		
^{119m} Sn	2.97E-01	²³⁸ U	6.96E+02		
^{121m} Sn	7.96E+01	²³⁷ Np	5.72E+01		
¹²³ Sn	1.74E-05	²³⁸ Pu	1.11E+05		
¹²⁶ Sn	1.56E+02	²³⁹ Pu	2.18E+05		
¹²⁴ Sb	3.03E-18	²⁴⁰ Pu	1.19E+05		
¹²⁵ Sb	3.35E+04	²⁴¹ Pu	6.68E+06		
¹²⁶ Sb	2.18E+01	²⁴² Pu	5.49E+01	Total	5.49E+07

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3.0 APPLICABLE REGULATIONS

Applicable requirements for monitoring existing or potential releases of radioactive and non-radioactive substances to the environment are contained in U.S. Department of Energy (DOE) orders and federal, state, and local laws, regulations, and permits. Table 3-1 gives a brief summary of the applicable requirements and industry standards applicable to the SNF Project and Table 3.2 are SNF Project facility permits. Also, Fluor Hanford, Inc. (FH) has established policies and procedures to implement regulatory requirements as found in HNF-PRO-450, "Air Quality Program," HNF-PRO-453, "Environmental Notification and Reporting," HNF-PRO-456, "Water Quality," HNF-PRO-457, "Environmental Requirements Evaluation," and HNF-PRO-2364, "Radioactive Airborne Effluent Sampling." Requirements for the SNF Project are contained in Chapter 20 of HNF-SD-SNF-RD-001, Rev. 002 (Standards/Requirements Identification Documents [SRID]). As the removal of fuel, sludge, water, and debris from the K Basins has been categorized as a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Interim Remedial Action, requirements in the form of applicable, relevant, and appropriate requirements have also been prescribed in the CERCLA Record of Decision (ROD)(DOE, 1999).

3.1 U.S. DEPARTMENT OF ENERGY ORDERS

The DOE Order 5400.1, "General Environmental Protection Program," requires a written environmental monitoring plan for each site, facility, or process that uses, generates, releases, or manages significant pollutants or hazardous materials. The plan must include the rationale and design criteria for the monitoring program, as well as describe the extent and frequency of the monitoring analysis. The plan also must contain quality assurance (QA) requirements, program implementation procedures, directions for preparation and implementation of reports, and directions for identification and discussion of effluent monitoring and environmental surveillance.

The effluent monitoring portion of the plan must verify compliance with applicable regulations and DOE orders, i.e., DOE 5400.5 "Radiation Protection of the Public and the Environment." It also should evaluate the effectiveness of treatment; identify potential environmental problems; evaluate the need for remedial action or mitigation measures; support permit revision and/or reissuance; and detect, characterize, and report unplanned releases. Compliance with the requirements of DOE Order 5400.5 may be demonstrated based on calculations from monitoring and surveillance programs.

Table 3-1. Applicable Regulations and Standards. (2 sheets)

Agency/Originator	Regulation and Standard	HA	HL	RA	RL	Summary/Application
U.S. Department of Energy (DOE), Washington, D.C.	DOE Order 5400.1 (DOE 1988) General Environmental Protection Program	X	X	X	X	Outlines effluent monitoring requirements
	DOE Order 5400.5 (DOE 1990) Radiation Protection of the Public and Environment			X	X	Protects public/environment from radiation associated with DOE operations
	DOE/EH-0173T (DOE 1991) Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance			X	X	Provides guidance for effluent sampling and monitoring.
	40 CFR 60 Standards of Performance for New Stationary Sources	X		X		
	40 CFR 61, Subpart H, National Emission Standards for Emissions of Radionuclides other than Radon from DOE facilities			X		Sets emissions standards/monitoring requirements for radionuclides
U.S. Environmental Protection Agency (EPA), Washington, D.C.	40 CFR 70 State Operating Permit Program	X		X		Requires air operating permit programs for states; Washington State program regulated under WAC 173-401
	10 CFR 82 Protection of Stratosphere Ozone	X				Sets requirements for industrial process refrigeration equipment.
	40 CFR 122, EPA Administered Permit Programs: The National Pollutant Discharge Elimination System		X			Governs release of nonradioactive liquids
	N 13.1* (ANSI 1999) (ANSI 1969) Guidance to Sampling Airborne Radioactive Materials in Nuclear Facilities			X		Sets standards for effluent monitoring systems
	N509 (ANSI/ASME 1999) Nuclear Power Plant Air-Cleaning Units and Components			X		Sets standards for design, construction, and acceptance testing of air-cleaning systems
American National Standards Institute, (ANSI) New York, New York	N510 (ANSI/ASME 1999) Testing of Nuclear Air Treatment Systems			X		Sets standards for field testing of air-cleaning systems

Table 3-1. Applicable Regulations and Standards. (2 sheets)

Agency/Originator	Regulation and Standard	HA	HL	RA	RL	Summary/Application
Washington State Department of Ecology, Olympia, Washington	WAC 173-200 Water Quality Standards for Groundwater		X		X	Establishes groundwater quality standards for the protection of that resource
	WAC 173-216 State Waste Discharge Permit Program		X		X	Governs discharges to ground and surface waters
	WAC 173-225 Federal Water Pollution Control - Establishment of Implementation Procedures of Application for Certification		X		X	Governs the state certification program for discharges to navigable waterways
	WAC 173-240 Submission of Plans and Reports for Construction of Wastewater Facilities		X			Controls release of nonradioactive liquids
	WAC 173-400 General Regulations for Air Pollution Sources	X				Sets emissions standards for hazardous air pollutants
	WAC 173-401 Air Operating Permit Program	X		X		Establishes an operating permit for hazardous (regulated) air pollutants, including radionuclides
	WAC 173-460 Control for New Sources of Toxic Air Pollutants	X				Sets standards or new sources of toxic air pollutants
	WAC 173-480 Washington State Ambient Air Quality Standard and Emission Limits for Radionuclides	X		X		Endorses the 10 mrem/yr EDE-EPA standards (40 CFR 61, Subpart H)
	WAC 246-272 Onsite Sewage Systems		X			Sets the standards for construction and operation of sanitary waste disposal facilities.
	WAC 246-247 Radiation Protection - Air Emissions			X		Sets standards for registration, permitting, notification, new sources, review, monitoring, and reports.
Benton Clean Air Authority	FF-01 Radioactive Airborne Emissions			X		Collective emissions from registered sources shall meet the emissions requirements of WAC 173-480.
	BCAA Regulation 1	X				Regulates open burning and renovation or demolition work involving asbestos.

Notes:

HA = hazardous airborne.

HL = hazardous liquid.

RA = radioactive airborne.

RL = radioactive liquid.

* Refers to standards that are referenced in the DOE and EPA regulations.

Table 3-2. Spent Nuclear Fuel Project Facility Permits

Permit Type	Permit Description
NPDES	National Pollutant Discharge Elimination System Permit Application was submitted to EPA October 1997. Permit Number WA-002591-7 (NPDES) issued by EPA April 2, 1999
	Notice of Intent to EPA for coverage under the NPDES/MSGP for stormwater, DOE-RL letter to EPA 99-EAP-107, December 28, 1998
State Waste Discharge Permits	State Waste Discharge Permits ST 4508 and ST 4509, including Pollution Prevention and Best Management Practices Plan, DOE/RL-97-67, Rev. 3
Toxic Air Permits	State of Washington Department of Ecology Toxic Air Pollutants Phase II Notice of Construction for the Hanford Site Spent Nuclear Fuel Project—Cold Vacuum Drying Facility, DOE/RL-96-100, and Washington Department of Ecology Approval Order 97NM-022, dated March 7, 1997.
Radioactive Air Permits	1724K Maintenance Shop Notice of Construction (does not have a DOE/RL number) transmitted to Ecology per 97-EAP-758, dated November 17, 1997, and Ecology Approval Order 97NM-551.
	Source Registration for Radioactive Air Emissions, Department of Health, FF-01
	Radioactive Airborne Notice of Construction for 105-KE Fuel Removal, DOE/RL-96-101, Rev 0
	- Washington State Department of Health (DOH) approval letter AIR 97-206 dated March 5, 1997
	- EPA approval letter, AJ Frankel to JE Rasmussen, dated April 22, 1997
	Radioactive Airborne Notice of Construction for KW Fuel Removal, DOE/RL-97-28, Rev 0A
	- DOH approval: letter: AIR 98-105, dated January 29, 1998, "Corrected Letter"
	- EPA approval letter: AJ Frankel (EPA) to JE Rasmussen (RL), dated December 23, 1997
	Radioactive Air Emissions Notice of Construction for 105-KW Filter Vessel Sparging Vent, DOE/RL-98-02, Rev 0
	- DOH approval: letter: AIR-98-307, dated March 12, 1998
	- EPA approval letter: AJ Frankel (EPA) to JE Rasmussen (RL), dated March 24, 1998 and letter AJ Frankel (EPA) to JE Rasmussen (RL) dated November 4, 1998
	- DOH approval letter: AIR-98-1005, dated October 8, 1998
	Radioactive Air Emissions Notice of Construction Cold Vacuum Drying Facility Phase II, DOE/RL-96-110, Rev. 1
	- DOH approval: letter: AIR-99-804, dated August 5, 1999
	- EPA approval letter from AJ Frankel to JE Rasmussen, dated January 10, 1997
	Radioactive Air Emissions Notice of Construction Canister Storage Building (revised Sealing Configuration for Spent Nuclear Fuel), DOE/RL-98-30, Rev. 0
	- DOH approval: letter: AIR-98-710, dated July 30, 1998
	- EPA approval letter from AJ Frankel to JE Rasmussen dated August 26, 1998
	Radioactive Air Emissions Notice of Construction 200 Area Interim Storage Area (does not have a DOE/RL number) as transmitted to DOH in letter 98-EAP-182 dated March 25, 1998 and EPA in letter 98-EAP-181, dated March 25, 1998
	- DOH approval letter AIR 98-503, dated May 20, 1998
	- EPA approval letter, AJ Frankel to JE Rasmussen dated June 24, 1998

Table 3-2. Spent Nuclear Fuel Project Facility Permits

Permit Type	Permit Description
Washington State Department of Health Permit to Operated On- Site Sewage Systems	Permit Number HAN099 <ul style="list-style-type: none"> • 183-KE Holding Tank System • Septic Tank 1607-K4 • Two Holding Tank Systems near Buildings 105KE and 105KW
RCRA Permits	1706KE Waste Treatment System Part A
	Letter DOE-RL to Ecology, 99-EAP-362, dated July 8, 1999

The DOE Guide, EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance" specifies the necessary elements for effluent monitoring and environmental surveillance of radioactive materials at DOE facilities for compliance with both applicable federal regulations and DOE policy.

3.2 FEDERAL REGULATIONS

3.2.1 National Emission Standards for Hazardous Air Pollutants (40 Code of Federal Regulations 61, Subpart H)

Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," (40 Code of Federal Regulations [CFR] 61) establishes exposure limits and monitoring requirements. The exposure limits, for a member of the public, from radionuclide air emissions is an effective dose equivalent (EDE) not to exceed 10 mrem/yr. Compliance with this standard is measured by calculating the highest EDE where a person resides or abides using an U.S. Environmental Protection Agency (EPA)-approved method.

Emissions of radionuclides must be measured at all release points that have a potential to discharge radionuclides into the air in quantities that could cause an EDE in excess of one percent of the standard. If the EDE caused by all emissions is less than one percent of the standard, the facility is exempt from the EPA monitoring requirements. All radionuclides that could contribute greater than 10 percent of the potential EDE for a release point shall be measured individually. For other release points that have a potential to release radionuclides into the air, periodic confirmatory measurements shall be made to verify low emissions.

3.2.2 State Operating Permit Program (40 Code of Federal Regulation 70)

This regulation defines the minimum elements required by the *Federal Water Pollution Control Act of 1972* for state operating permit programs and corresponding standards and procedures by which the administrator will approve, oversee, and withdraw approval of state operating permit programs.

3.2.3 Environmental Protection Agency-Administered Permit Programs: The National Pollutant Discharge Elimination System (40 Code of Federal Regulations 122)

This regulation covers basic EPA permitting requirements and procedures for EPA processing of permit applications

3.3 INDUSTRY STANDARDS UNDER AMERICAN NATIONAL STANDARDS INSTITUTE

3.3.1 Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities (American National Standards Institute N13.1-1999 & 1969)

The primary objective for sampling airborne radioactivity in effluents is to measure the release of radioactive materials to the environment. This is accomplished through sampling near the point of release.

The objective of American National Standards Institute (ANSI) N13.1-1999 and 1969 is to set forth the principles that apply in obtaining valid samples of airborne radioactive materials and to prescribe acceptable methods and materials for gaseous and particulate sampling. ANSI N13.1-1999 and 1969 is limited to the collection of samples and does not address measurement of the radioactive materials collected.

3.3.2 Nuclear Power Plant Air-Cleaning Units and Components, American National Standards Institute/American Society of Mechanical Engineers N509

This standard covers requirements for the design, construction, and qualification and acceptance testing of nuclear air treatment systems.

3.3.3 Testing of Nuclear Air Treatment Systems, American National Standards Institute/American Society of Mechanical Engineers N510

This standard covers field testing of nuclear air treatment systems.

3.4 WASHINGTON STATE REGULATIONS

3.4.1 Water Quality Standards for Groundwater (Washington Administrative Code 173-200)

The water quality standards to protect groundwater to the radiation level of drinking water standards is contained in "Water Quality Standards for Groundwaters of the State of Washington" (Washington Administrative Code [WAC] 173-200). These standards limit exposure to gross alpha, gross beta, tritium, ⁹⁰Sr, and ^{226, 228}Ra. For radionuclides that are not specifically listed, exposures are limited by the federal standard to an EDE not to exceed four mrem/yr.

3.4.2 State Waste Discharge Permit Program (Washington Administrative Code 173-216)

The purpose of this state regulation is to implement a state permit program, applicable to the discharge of waste materials from industrial operations into ground and surface waters of the state. However, this regulation excludes point source discharge of pollutants into navigable waters of the state, which is regulated by the "National Pollutant Discharge Elimination System (NPDES) Permit Program" (WAC 173-220). This regulation also excludes the injection of fluid through wells, which is regulated by "Underground Injection Control Program" (WAC 173-218).

3.4.3 Federal Water Pollution Control Act - Establishment of Implementation Procedures of Application for Certification (Washington Administrative Code 173-225)

The *Federal Water Pollution Control Act of 1972* provides that applicants for a license or permit from the federal government relating to any activity that may result in any discharge into the navigable waters shall obtain a certification from the state in which the discharge originates. The purpose of this regulation is to establish procedures for public notice and public hearings in relation to processing of applications for certification.

3.4.4 Submission of Plans and Reports for Construction of Wastewater Facilities (Washington Administrative Code 173-240)

Before the construction or modification of wastewater facilities, engineering reports and plans and specifications for the project shall be submitted to and approved by the state.

3.4.5 General Regulations for Air Pollution Sources (Washington Administrative Code 173-400)

It is the policy of the Washington State Department of Ecology (Ecology) to provide for the systematic control of air pollution from air contamination sources and for the proper development of the state's natural resources.

3.4.6 Air Operating Permit Program (Washington Administrative Code 173-401)

The provisions in this regulation establish the element of a comprehensive Washington State air operating permit program consistent with the requirements of the *Federal Clean Air Act of 1977*. all sources (hazardous and radionuclides pollutants) subject to this regulation shall have a permit to operate that assures compliance by the service with all applicable requirements.

3.4.7 Controls for New Sources of Toxic Air Pollutants (Washington Administrative Code 173-460)

This regulation establishes the systematic control of new services that emit non-radioactive toxic air pollutants (in order to prevent air pollution), emission reduction (to the extent reasonably possible), and maintenance of such levels of air quality as will protect human health and safety. Toxic air pollutants include carcinogens and noncarcinogens listed in WAC 173-460-150 and 173-460-160.

3.4.8 Ambient Air Quality Standards and Emission Limits For Radionuclides (Washington Administrative Code 173-480)

Although the standard for Washington State establishes a 25-millirem/year (mrem/yr) EDE for public exposure to radionuclide emissions, facilities must comply with the most restrictive of federal, state, or local law. Therefore, the exposure limit that must be complied with is 10 mrem/yr; however, compliance is calculated at the point of maximum annual air concentration in an unrestricted area where any member of the public may be located.

3.4.9 Radiation Protection - Air Emissions (Washington Administrative Code 246-247)

This regulation specifies new source review, notification, registration, and permitting requirements associated with any source of radioactive air emissions in Washington State, including those on the Hanford Site. One requirement listed in WAC 246-247 is the semiannual (twice yearly) reporting of emissions from each registered stack or vent onsite. By agreement with Washington State Department of Health (DOH), only annual reporting is required.

3.5 LOCAL REGULATIONS

3.5.1 Benton Clean Air Authority

The local air pollution control authority has jurisdiction over open burning and renovations or demolition work involving asbestos.

3.6 SPENT NUCLEAR FUEL PROJECT PERMITS

3.6.1 National Pollution Discharge Elimination System

3.6.1.1 National Pollutant Discharge Elimination System (WA-002541-7)

This permit authorizes point discharges to the Columbia River from Outfalls 003 and 004.

3.6.1.2 Authorization to Discharge Under National Pollutant Discharge Elimination System for Storm Water Discharge

On September 30, 1998, the EPA notified facilities (Hanford) permitted under the NPDES Baseline Industrial General Storm Water Permit (Permit) that the Permit had been terminated (Federal Register Volume 63). The EPA directed facilities to pursue continued storm water permit coverage under the NPDES Storm Water MSGP through submittal of a Notice of Intent (NOI) December 29, 1998. An NOI was submitted to EPA in December 1998 for coverage under the MSGP (99-EAP-10). The MSGP provides coverage of 100K outfall storm water discharges under Sector O for Steam Electric Power Generating facilities. The specific Sector O permit conditions are identified in HNF-4081, "Storm Water Pollution Prevention Plan."

3.6.2 State Waste Discharge Permit

The permit ST 4508 for hydrotest, maintenance, and construction discharges was issued by the Ecology, May 1997. The permit ST 4509 for cooling water and condensate discharges was issued by Ecology, May 1998. The ST 4510 for industrial storm water discharges to engineered structures was issued by Ecology, April 1999.

3.6.3 Toxic Air Permit

A Toxic Air Permit from Ecology was obtained for the CVDF and the 1724K Maintenance facility. These permits were required because a new source of emission of a toxic air pollutant was being constructed.

3.6.4 Washington State Department of Health and U.S. Environmental Protection Agency Notice of Construction Approvals

Several Notices of Construction (NOCs) (see Table 3.2) for SNF Project facilities have been submitted to DOH and EPA for approval pursuant to WAC 246-247 and 40 CFR 61. The NOCs described the processes relating to fuel removal/ conditioning/storage, source term, expected annual emission, radionuclide control and monitoring equipment, and projected dose to the maximally exposed individual.

NOCs are on file in the SNF Project Environmental Protection office.

3.6.5 Washington State Department of Health Permit to Operate On-Site Sewage Systems

All SNF Project sewage systems are less than 14,500 gallons/day capacity and are regulated by the DOH. Construction or modification of existing systems shall not commence prior to obtaining DOH approval.

3.6.6 Resource Conservation and Recovery Act

Per the SNF Project mission and scope of work as defined in the Project Execution Plan, HNF-3552, there is no treatment, storage, or disposal facility that requires permitting under Resource, Conservation and Recovery Act (RCRA). The only exception is pre-closure of the 1706KE Waste Treatment Systems for which a Part A permit withdrawal petition was submitted to Ecology. A proposal to disposition this unit under the CERCLA Remaining Sites ROD is under consideration with Ecology.

4.0 IDENTIFICATION AND CHARACTERIZATION OF EFFLUENT STREAMS

Both liquid and gaseous effluent streams are generated at the SNF Project facilities.

Radionuclides are discharged to the air from: (1) 105 KE Spent Fuel Storage Basin; (2) 105 KW Spent Fuel Storage Basin; and (3) 1706 KE complex, (4) CVDF and, (5) CSB. Radionuclides are discharged to the Columbia River from one discharge point located at the 1908 Outfall, also known as NPDES Outfall 004 for past reactor operations. The major radionuclides emitted from the effluent release points through the air pathway and the liquid effluent pathway are ^3H , ^{60}Co , ^{90}Sr , ^{134}Cs , ^{137}Cs , ^{238}Pu , ^{239}Pu , ^{40}Pu , ^{241}Pu , ^{241}Am , ^{155}Eu , ^{106}Ru , ^{125}Sb , and ^{154}Eu . A non-hazardous liquid stream is discharged to the Columbia River, known as NPDES Outfall 003.

4.1 IDENTIFICATION AND CHARACTERIZATION OF CONTAMINANTS TO EACH EFFLUENT STREAM

This section describes contaminants that actually or potentially contribute to the SNF Project facilities effluent streams during routine operating conditions. General information for all streams is provided in Table 4-1 for liquids and Table 4-2 for gaseous streams.

4.1.1 Routine Operating Conditions

Radioactivity is released from roof vents or stacks or several of the SNF Project facilities (see Table 4-3 for release quantities). The types of releases are listed below:

- Radioactivity is released from the roof vents over the KE and KW Basins which are not high efficiency particulate air (HEPA) filtered. Maintaining basin water quality through operation of the skimmer system or primary recirculation system has been determined to be Reasonable Achievable Control Technology (RACT) to control airborne emissions by DOH (AIR-92-107). The KW Basin has one air sparging vent for the Integrated Water Treatment System (IWTS) that has high efficiency particulate air (HEPA) environmental controls. The isotopes that may be released include ^{60}Co , ^{90}Sr , ^{134}Cs , ^{137}Cs , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Am , ^{155}Eu , ^{106}Ru , ^{125}Sb , and ^{154}Eu .
- Radioactivity is released from the roof vents of the 1706 KE office complex. The isotopes that may be released from the operational stack include ^{90}Sr , ^{106}Ru , ^{125}Sb , ^{134}Cs , ^{137}Cs , ^{155}Eu , ^{238}Pu , ^{239}Pu , and ^{240}Pu .
- Radioactivity is released from the stack vents for the CVDF and the CSB with the use of a HEPA filter for environmental controls. The isotopes that may be released are the same as stated above for the KE and KW Basins.

Radionuclides are released by the 1908 KE Outfall. The isotopes that are released include ^{60}Co , ^{106}Ru , ^{134}Cs , and ^{137}Cs .

4.1.2 Routine Operating Conditions for Toxics

Toxic emissions are not monitored at the facilities listed in Table 4.4. The releases are below WAC 173-400-080 monitoring requirements. This is documented in the NOCs to Ecology and the Ecology Approval Orders..

4.1.3 Upset Operating Conditions

Characteristics of liquid effluent and airborne emissions generated from upset conditions are described in the SNF Project Final Safety Analysis Report (SAR) (HNF-3553).

Table 4-1. Spent Nuclear Fuel Project Liquid Effluent Streams. (2 sheets)

Discharge Designation	Facilities Served	Liquid Waste Description	Chemical Content	Radioactive Material Content	Comments
1908 KE Outfall 004 NPDES WA-00-2541-7	183 KE 185K 1706 KE	Backwash/leakage Process drains potable water plant	None	⁶⁰ Co, ¹⁰⁶ Ru, ¹³⁴ Cs, ¹³⁷ Cs (From contaminated discharge pipe)	Low concentration of radionuclides released from residual contamination from past reactor operations
Tile field 1607-K4	1717 K 1709 K 1722 K 1718 K 1711 K 1719 K	Kitchen and rest room sanitary waste	None	None	No hazardous chemical
Tile field 1607-K5	105 KE 1706 KE	Kitchen and rest room sanitary waste	None	None	No hazardous chemical
Tile field 1607-K6	105 KW	Kitchen and rest room sanitary waste	None	None	No hazardous chemical
Tile field 1607-K2	183 KE	Kitchen and rest room sanitary waste	None	None	No hazardous chemical
Tile field 1607-K1	1721 K 1720 K	Kitchen and rest room sanitary waste	None	None	No hazardous chemical
Holding tank	MO500	Kitchen and restroom sanitary waste	None	None	No hazardous chemical
Holding tank	CVD	Kitchen and restroom sanitary waste	None	None	No hazardous chemical
Holding tank	1725 K 1726 K	Kitchen and restroom sanitary waste	None	None	No hazardous chemical
Holding tank	1730K	Kitchen and restroom sanitary waste	None	None	No hazardous chemical
Holding tank	1728 K 1729 K	Kitchen and rest- room sanitary waste	None	None	No hazardous chemical
Holding tank (additional)	CVD (office trailer)	Kitchen and rest- room sanitary waste	None	None	No hazardous chemical
Septic field	CSB (office trailer)	Kitchen and restroom sanitary waste	None	None	No hazardous chemical

Table 4-1. Spent Nuclear Fuel Project Liquid Effluent Streams. (2 sheets)

Discharge Designation	Facilities Served	Liquid Waste Description	Chemical Content	Radioactive Material Content	Comments
State Waste Discharge Permit ST 4508	All SNFP areas	Hydrotest, maintenance, construction	None	None	No hazardous chemical
State Waste Discharge Permit ST 4509	All SNFP areas	Cooling water, condensate	None	None	No hazardous chemical
State Waste Discharge Permit ST 4510	There are no SNFP facilities that apply to this type of discharge.	Storm water	None	None	No hazardous chemical
1908 KE Outfall multi-sector general permit storm water	100 K Area	Raw water collected by inlets that go to the 1908KE Outfall	None	None (from contaminated discharge pipe)	Low concentration of radionuclides released from past reactor operations

Table 4-2. Spent Nuclear Fuel Project Gaseous Effluent Streams. (1 sheet)

Discharge Designation	Facilities Served	Gaseous Effluent Description	Hazardous Chemical Content	Radioactive Material Content	Comments
Building exhaust fans (4)	105 KE Basin and Highbay	Building exhaust	None	^{60}Co , ^{90}Sr , ^{134}Cs , ^{238}Pu , ^{239}Pu , ^{137}Cs , ^{240}Pu , ^{241}Pu , ^{241}Am , ^{155}Eu , ^{106}Ru , ^{125}Sb , ^{154}Eu	Samples taken weekly/analyzed monthly
Building exhaust fans (4)	105 KW Basin and Highbay	Building exhaust	None	^{60}Co , ^{90}Sr , ^{134}Cs , ^{137}Cs , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu , ^{241}Am , ^{155}Eu , ^{106}Ru , ^{125}Sb , ^{154}Eu	Samples taken weekly/analyzed monthly
Exhaust hoods canopy	1706 KE Main Floor 0-ft level	Exhaust	None	^{90}Sr , ^{106}Ru , ^{125}Sb , ^{134}Cs , ^{155}Eu , ^{238}Pu , $^{239,240}\text{Pu}$	Exhaust is HEPA filtered, samples taken monthly and analyzed quarterly.
Stack exhaust	105 KW IWTS	Exhaust Air Sparging IWTS	None	^{60}Co , ^{90}Sr , ^{106}Ru , ^{125}Sb , ^{134}Cs , ^{137}Cs , ^{154}Eu , ^{155}Eu , ^{238}Pu , $^{239,240}\text{Pu}$, ^{241}Pu , ^{241}Am	Stack exhaust is HEPA filtered, samples taken quarterly if operational or yearly if passive venting
Stack exhaust	CVDF	Exhaust	Toxic: Be, Cd, Cr, Ni, Pb, Sb, Ba, Mn, U, Zr	gas: ^3H , ^{14}C , ^{85}Kr , ^{129}I Solid /particulate matter: ^3H , ^{14}C , ^{60}Co , ^{85}Kr , ^{90}Sr , ^{90}Y , ^{125}Sb , ^{125m}Te , ^{129}I , ^{134}Cs , ^{137}Cs , ^{154}Eu , ^{155}Eu , ^{234}U , ^{235}U , ^{236}U , ^{238}U , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu , ^{241}Am	Stack exhaust is HEPA filtered, samples taken monthly and analyzed quarterly Toxics are not monitored
Stack exhaust 1724K	Maintenance Shop	Exhaust	Organic vapors	N/A	Not operational
Stack exhaust	CSB	Exhaust	None	^3H , ^{14}C , ^{60}Co , ^{85}Kr , ^{90}Sr , ^{90}Y , ^{125}Sb , ^{125m}Te , ^{129}I , ^{134}Cs , ^{137}Cs , ^{154}Eu , ^{155}Eu , ^{234}U , ^{235}U , ^{236}U , ^{238}U , ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu , ^{241}Am	Stack exhaust is HEPA filtered, samples taken monthly and analyzed quarterly.

Note:

HEPA = High-efficiency particulate air [filter]

Table 4-3. Normal Operation Radioactive Emissions for Spent Nuclear Fuels Project Facility.
(Sheet 1 of 5)

Release Point	Radionuclide	Annual Release Quantity (Ci)
1908 KE Outfall (liquid HNF-EP-0527-8)	⁹⁰ Sr	2.4E-04
	^{239, 240} Pu	1.3E-06
	²⁴¹ Am	1.7E-05
	Total Alpha	1.0E-04
	Total Beta	5.9E-04
105 KE (air emission DOE/RL-99-41)	⁹⁰ Sr	1.4E-05
	¹³⁷ Cs	2.6E-05
	²³⁸ Pu	5.1E-07
	^{239, 240} Pu	3.1E-05
	²⁴¹ Pu	3.8E-05
	²⁴¹ Am	1.9E-06
105 KW (air emission DOE/RL-99-41)	⁹⁰ Sr	4.2E-07
	¹³⁷ Cs	3.9E-06
	²³⁸ Pu	6.1E-10
	^{239, 240} Pu	2.3E-08
	²⁴¹ Pu	3.4E-07
	²⁴¹ Am	4.1E-08
1706 KE Main Floor (0-ft level) air emission (DOE/RL-99-41)	Total Alpha	1.9E-07
	Total Beta	7.8E-07
Stack exhaust 105 KW Integrated Water Treatment System (IWTS) Air Sparging (per NOC for abated discharges, DOE/RL-98-02, Rev. 0)	⁶⁰ Co	1.87E-05
	⁹⁰ Sr	4.4E-02
	¹⁰⁶ Ru	4.85E-06
	¹²⁵ Sb	1.56E-04
	¹³⁴ Cs	8.68E-05
	¹³⁷ Cs	5.66E-02
	¹⁵⁴ Eu	4.74E-04
	¹⁵⁵ Eu	9.69E-05
	²³⁸ Pu	4.32E-04
	^{239/240} Pu	1.30E-03
	²⁴¹ Pu	2.55E-02
	²⁴¹ Am	1.41E-03

Table 4-3. Normal Operation Radioactive Emissions for Spent Nuclear Fuels Project Facility.
(sheet 2 of 5)

Release Point	Radionuclide	Annual Release Quantity)(Ci)
Stack Exhaust Cold Vacuum Drying Facility (CVD)(per NOC for abated discharges, DOE/RL-96-110, Rev. 1)	H-3	7.13E-00
	H-3	6.10E-06
	C-14	1.35E-01
	C-14	1.15E-07
	Fe-55	5.55E-07
	Co-60	1.19E-06
	Ni-59	1.24E-08
	Ni-63	1.35E-06
	Se-79	2.60E-08
	Kr-85	1.15E+02
	Kr-85	9.83E-05
	Sr-89	0.00E+01
	Sr-90	3.05E-03
	Y-90	3.05E-03
	Y-91	6.72E-24
	Zr-93	1.21E-07
	Zr-95	5.10E-22
	Nb-93m	7.45E-08
	Nb-95	1.13E-21
	Nb-95m	3.77E-24
	Tc-99	8.68E-07
	Ru-103	0.00E+01
	Ru-106	5.49E-07
	Rh-103m	0.00E+01
	Rh-106	5.49E-07
	Pd-107	4.91E-09
	Ag-110	8.56E-14
	Ag-110m	6.45E-12
	Cd-113m	1.07E-06
	Cd-115m	0.00E+01
	In-113m	6.45E-17
	Sn-113	6.45E-17
	SN-119m	8.96E-11
	Sn-121m	2.40E-08

Table 4-3. Normal Operation Radioactive Emissions for Spent Nuclear Fuels Project Facility.
(sheet 3 of 5)

Release Point	Radionuclide	Annual Release Quantity(Ci)
Stack Exhaust Cold Vacuum Drying Facility (CVD)(per NOC for abated discharges, DOE/RL-96-110, Rev. 1)	Sn-123	5.25E-15
	Sn-126	4.70E-08
	Sb-124	9.14E-28
	Sb-125	1.01E-05
	Sb-126	6.57E-09
	Sb-126m	4.70E-08
	Te-123m	8.23E-21
	Te-125m	2.47E-06
	Te-127	2.86E-16
	Te-127m	2.92E-16
	Te-129	0.00E+01
	Te-129m	0.00E+01
	I-129	1.24E-03
	I-129	1.06E-09
	Cs-134	4.79E-06
	Cs-135	2.34E-08
	Cs-137	3.98E-03
	Ba-137m	3.77E-03
	Ce-141	0.00E+01
	Ce-144	2.76E-07
	Pr-143	0.00E+01
	Pr-144	2.72E-07
	Pr-144m	3.32E-09
	Pm-147	1.39E-04
	Pm-148	0.00E+01
	Pm-148m	0.00E+01
	Sm-151	5.31E-05
	Eu-152	2.85E-07
	Eu-154	3.23E-05
	Eu-155	6.66E-06
	Gd-153	3.86E-14
	Tb-160	8.35E-25
	U-234	2.64E-07
	U-235	1.02E-08
	U-236	3.83E-08
	U-238	2.10E-07

Table 4-3. Normal Operation Radioactive Emissions for Spent Nuclear Fuels Project Facility.
(sheet 4 of 5)

Release Point	Radionuclide	Annual Release Quantity(Ci)
Stack Exhaust Cold Vacuum Drying Facility (CVD)(per NOC for abated discharges, DOE/RL-96-110, Rev. 1)	Np-237	1.72E-08
	Pu-238	3.35E-05
	Pu-239	6.57E-05
	Pu-240	3.59E-05
	Pu-241	2.01E-03
	Pu-242	1.66E-08
	Am-241	1.13E-04
	Am-242	5.88E-08
	Am-242m	5.91E-08
	Am-243	3.62E-08
	Cm-242	4.88E-08
	Cm-244	4.34E-07
Total		1.22E+02

Table 4-3. Normal Operation Radioactive Emissions for Spent Nuclear Fuels Project Facility.
(sheet 5 of 5)

Release Point	Radionuclide		Annual Release Quantity (Ci)
Stack Exhaust Canister Storage Building (per NOC for abated discharges, DOE/RL-98-30, Rev. 0)	^3H	Gas	4.38E+01
	^3H		1.16E-05
	^{14}C	Gas	8.28E-01
	^{14}C		2.20E-07
	^{60}Co		6.67E-06
	^{85}Kr	Gas	7.24E+02
	^{85}Kr		1.92E-04
	^{90}Sr		1.63E-02
	^{90}Y		1.63E-02
	^{125}Sb		5.65E-05
	$^{125\text{m}}\text{Te}$		1.38E-05
	^{129}I	Gas	7.41E-03
	^{129}I		1.97E-09
	^{134}Cs		2.81E-05
	^{137}Cs		2.10E-02
	$^{137\text{m}}\text{Ba}$		1.98E-02
	^{147}Pm		8.18E-04
	^{151}Sm		2.80E-04
	^{154}Eu		1.68E-04
	^{155}Eu		3.63E-05
	^{234}U		1.47E-06
	^{235}U		5.66E-08
	^{236}U		2.11E-07
	^{238}U		1.16E-06
	^{238}Pu		2.03E-04
	^{239}Pu		3.75E-04
	^{240}Pu		2.16E-04
	^{241}Pu		1.06E-02
	^{241}Am		5.76E-04

Table 4-4. Normal Operation Toxic Emissions Spent Nuclear Fuels Project Facility.

Release Point	Toxic	Annual Release Quantity (lb/yr)
Exhaust Stack Cold Vacuum Drying Facility (per NOC, DOE/RL-96-100) Toxics are not monitored at the facility.	Be	3.70E-08
	Cd	7.28E-08
	Cr	1.38E-05
	Ni	2.62E-08
	Pb	8.25E-07
	Sb	3.74E-08
	Ba	4.71E-07
	Mn	7.13E-07
	U	1.12E-04
	Zr	7.66E-07
Exhaust Maintenance Shop 1724K The NOC and Ecology Order do not prescribe the need to perform emissions monitoring as this is an insignificant source emission. (per NOC, 97-EAP-758 and Ecology Order 97 AM-551)	N/A	N/A

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5.0 EFFLUENT POINT OF DISCHARGE DESCRIPTION

5.1 AIRBORNE DISCHARGE POINTS

As noted in Section 2-1, the SNF Project is comprised of various facilities. Five of these facilities contain systems or materials that could contribute radiological contamination to the airborne effluent streams. These air release points are in the 105 KE Basin, 105 KW Basin, 1706 KE Facility Complex, CVDF, and CSB and consist of exhaust vents and stacks which are described below.

5.1.1 105 KE Basin Exhaust Vents (Rad)

The 105 KE Basin exhaust vents are located on the roof of the building directly above the fuel storage basin and transfer area, approximately 15 ft and 38 ft above ground, respectively. The combined air flow from the four roof vents is 54,780 ft³/min. See Figure 5-1.

The exhausts vent air directly to the atmosphere without HEPA filtration. Monitoring basin water quality has been accepted by DOH as RACT (AIR 92-107).

5.1.2 105 K West Basin Exhaust Vents (Rad)

The 105 KE and 105 KW Basin structures are in most respects identical in design and vent characteristics.

The 105 KW Basin exhaust vents are located on the roof of the building directly above the fuel storage basin and transfer area approximately 15 ft and 38 ft above ground respectively. The combined flow from the four roof vents is 39,035 ft³/min. See Figure 5-1.

The exhausts vent air directly to the atmosphere without HEPA filtration. Maintaining basin water quality has been accepted by DOH as RACT (AIR 92-107).

5.1.3 105 K West Basin Air Sparging Vent (Rad)

The 105 KW Basin air sparging vent is a separate emission point. It is also a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr. The stack is 3 inches in diameter, 12 feet in height above the high bay roof and located on the north side of the 105 KW Basin.

Figure 5-1. 105 KE and 105 KW Release Points

5.1.4 Cold Vacuum Drying Facility 100 K Area (Rad)

The height and the diameter of CVDF main stack as shown in Figure 5-2 is 48 feet and 30 inches respectively. The main stack exhaust flow rate with four active processing bays will be approximately 17,650 cubic feet minute (future flow rate for five active processing bays would be approximately 19,800 cubic feet per minute). It is also a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr.

5.1.5 Canister Storage Building

The CSB process exhaust stack as shown in Figure 5-3 has an outside diameter of 28 inches and an outlet 56 feet above the top of the utilities. It is also a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr. The stack exhaust flow rate will be approximately 9,000 cfm.

5.1.6 1706 KE Office Complex Exhaust Vents (Rad)

The 1706 KE exhaust system is located on the west end of the roof of the 1706 KE Building. This system contains a bank of 12 HEPA filters and releases air at a rate of 340 m³/min (12,000 ft³/min). The release point is located approximately 7.6 m (25 ft) aboveground. The primary function of this exhaust is to ventilate hoods within the 1706KE Building. Some of these hoods contain one additional stage of HEPA filtration. The HEPA filters are aerosol tested yearly and the hood flows are checked monthly. The exhaust air is sampled at the discharge with a three-micron filter at a rate of 0.01 m³/min (0.5 ft³/min). These samples are changed and analyzed on a monthly basis. Schematics of the sampling and exhaust systems are shown in Figure 5-4.

5.1.7 1724K Maintenance Facility (Toxic)

The stack to the 1724K Maintenance facility is 27 inches in diameter and 10 feet in height above the roof. It serves to exhaust air from the paint booth.

As of August 2000, the construction of this system is incomplete (i.e. charcoal filters are not installed) and the paint booth is not in service.

Figure 5-2. CVD Major Stack

Figure 5-3. CSB Exhaust Stack

Figure 5-4. 1706 KE Exhaust Schematic.

5.2 LIQUID DISCHARGE POINTS

There are several liquid effluent discharges from the SNF Project facilities. A more detailed description of the release points is included in the following sections.

5.2.1 1908 KE Outfall (National Pollutant Discharge Elimination System Outfall 004) (Rad)

The primary liquid effluent discharge point at the K Area is the 1908 KE Outfall. This discharge is permitted as NPDES Outfall 004. Outfall 004 is used to discharge filter backwash effluent from the potable water plant following settling of suspended solids in one of the deactivated basins. Outfall 004 was also used in the past discharges of raw water from the 183 KE Basin being used for fish rearing activities. All of these streams are non-radioactive. When the reactor was operational, this outfall was used to discharge once-through reactor cooling water to the Columbia River. Consequently, the steel pipelines used to collect and route effluent stream to the river became contaminated with low-level radionuclides.

This outfall is a pair of 213-cm (84-in.)-diameter pipes that extend 412 m (1,350 ft) from the 1908 KE Building and discharge beneath the surface of the Columbia River near the center of the channel. The outfall, which is covered in rip-rap, is continuously monitored for flow. The samples for this outfall are drawn from the outfall pipe before the effluent reaches the 1908 KE Building. These are grab samples. This outfall discharges liquids to the Columbia River at a rate of approximately $2.48\text{E}+08$ gal/year (1994). A schematic of the sampling system is shown in Figure 5-5. Only one of the outfall discharge pipes is operational.

5.2.2 1908 K East Outfall Multi-Sector General Permit for Storm Water (Non-Rad)

The description of this outfall is the same as Section 5.2.1.

5.2.3 181-K East Outfall (National Pollutant Discharge Elimination System Outfall 003) (Non Rad)

Outfall 003, the discharge for the travelling water screen and backwash water, operates intermittently. This water contains only constituents removed from the river water being taken into the intakes of the 181 KE Building. The travelling screens remove debris from the river water brought into the 181 KE Building intakes. This outfall is a 30-cm (12-in.)-diameter pipe that discharges at an average rate of 18,927 L/day (5,000 gal/day) when operational. This pipe comes from the 181 KE Pumphouse, enters the ground, and bends to the north before discharging beneath the surface of the Columbia River approximately 175 m (575 ft) towards the center of the river. When operational, this outfall is grab sampled to ensure NPDES permit compliance. At present, this backwash is collected and trucked to one of the 183 KW sedimentation basins for evaporation, and there is no discharge.

5.2.4 Septic Holding Tanks/Drain Fields (Non Rad)

Sanitary sewage from office trailers, maintenance shops, offices, and etc. are processed as follows: (1) Collected in holding tanks, pumped to tanker trucks, and discharged to a sanitary facility; or (2) Discharged to ground by septic field.

5.2.5 Discharges to Ground State Waste Discharge Permits ST 4508/4509/4510 (Non Rad)

There are various activities at SNF Project facilities that could discharge to ground. The discharges from these facilities are controlled by Process Standards and Job Control System work packages. Each discharge must meet the groundwater quality standards. There are no engineered structures designed specified for these discharges.

6.0 EFFLUENT MONITORING/SAMPLING SYSTEM DESIGN CRITERIA

This section covers the SNF Project facility design criteria for effluent monitoring and sampling.

6.1 NEW FACILITIES

There are three new air emission points that are described in this FEMP. The new emission points and design criteria are presented in Table 6-1.

Table 6-1. New Emission Point Design Criteria

Facility	40 CFR 61 Emission Point Classificaiton	Remarks
CVD	Major	Designed per ANSI N13.1 – 1999
CSB	Major	Designed per ANSI N13.1 – 1969
105KW Air Sparge	Major	Alternate monitoring design described in DOE/RL-98-02, Rev. 0, and approved by EPA letter, March 1998 to use second HEPA as monitoring and sampling point.

6.2 EXISTING FACILITIES

There are three air and one liquid radioactive emission points at SNF Project existing facilities. The existing emission points and design criteria are presented in Table 6.2.

Table 6-2. Existing Emission Point Design Criteria

Facility	40 CFR 61 Emission Point Classificaiton	Remarks
105KE	Minor	Monitoring requirements contained in 40 CFR 61 and WAC 246-247 for periodic confirmatory measurements are the requirements governing the design and operation for this system.
105KW	Minor	Monitoring requirements contained in 40 CFR 61 and WAC 246-247 for periodic confirmatory measurements are the requirements governing the design and operation for this system.
1706KE	Minor	Monitoring requirements contained in 40 CFR 61 and WAC 246-247 for periodic confirmatory measurements are the requirements governing the design and operation for this system.
1908KE	N/A	This system is designed to meet DOH/EH-0173T requirements for a radioactive liquid continuous monitoring/sampling system

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7.0 CHARACTERIZATION OF CURRENT EFFLUENT MONITORING SYSTEM

This section provides a description of the air and liquid effluent monitoring systems at SNF Project facilities.

7.1 INSTRUMENT DESCRIPTION/SPECIFICATIONS FOR AIR

7.1.1 105K East/105 K West Basin Exhaust

The emissions sampling system consists of three samplers inside the 105 KE and 105 KW Fuel Basins. These samplers are located as follows: two are located over the 105 KE and 105 KW Basins and one is located in the transfer high bay area. The samplers over the 105 KE and 105 KW Basins are positioned directly in front of the roof vents, the inlet to the exhaust fans. The sample head filter assembly is attached to an adjustable support extended to the inlet of the fan, about 11 ft above the floor. The third sampler is in the transfer high bay area in proximity to the two roof vent inlets for the exhaust fans. The filter assembly for the high bay sampler is approximately 20 ft above the floor.

The sampler system design eliminates any sample line loss concerns. The particulate filter employed is a 1.85-in.-glass fiber filter with a 91 percent capture efficiency for particles with a median diameter of 0.3 micron. The sample filter assembly is connected to a vacuum pump by plastic tubing. Because the particulate filter is upstream of the plastic tubing, the particulate filter is not influenced by the tubing. The sample pumps are equipped with a flow regulator. The nominal sample flow rate is 2.12 ft³/min.

Operational checks of the exhaust fans and the sample pumps are performed daily. In the event a fan is found not operating or is de-energized for any reason, the sampler is turned off until the exhaust fan is returned to service. The operability information for the samplers and exhaust fans is logged and reported to monitoring program personnel. The sample pump flow rate is checked quarterly using a calibrated National Institute of Standards and Technology traceable flow meter.

The filters are changed weekly, and a monthly composite is made to approximate the radionuclides present in the air entering the exhaust vent. A schematic of the sampling system is shown in Figure 7-1.

These monitoring systems meet the requirements of 40 CFR 61 for minor stacks for periodic confirmatory monitoring.

A log has been established to document when these systems are operational. This information for run times is used to calculate the annual release. Maintenance/calibration of the monitoring equipment is performed according to written procedures.

Figure 7-1. 105 KE/KW Monitoring Schematic.

29505047.2

7.1.2 105 K West Air Sparging

The following section describes the emission monitoring system. The 105KW Air Sparging stack is a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr.

The sparging vent will normally be closed and will open intermittently for either passive ventilation of the sand/garnite filters during IWTS shutdown or for forced ventilation during air sparging of the sand/garnite filters.

The alternative approach involves using a second HEPA filter as the sampler for the entire air stream. The capture efficiency of the second HEPA filter will be 99.95 percent or particles with a median diameter of 0.3 micron. The second HEPA filter will undergo non destructive assay to detect the gamma rays emitted from the decay of the cesium-137 isotope using a gamma spectrometer. Because the entire exhausted flow is routed through the sample filter, essentially all emissions will be measured and accounted for. The assumption is made that whatever is on the sample filter would be exhausted to the atmosphere. This results in a highly conservative estimate of emissions, and does not under estimate emissions. Because the sample filter has at least a 99.95 percent efficiency for 0.3 micron particulates, better than 95 percent of the particulate emissions are expected to be collected on the filter. Assuming that the material collected on the filter was exhausted is extremely conservative for estimating actual emissions.

The measurements will be done quarterly whenever air sparging has been operated, i.e., a forced air flow has been used. If the vessels are only passively ventilated, i.e., air sparging has not been operated, then the measurements will be done at least annually. The increase in radionuclide content of the HEPA filter will be considered the emissions released over the period. The measured quantities and estimated values will be reported as the emissions for the filter vessel vent (air sparging) for the sample period. A schematic of the system is shown in Figure 7.2.

A log has been established to document when this system is operational. This information for run times is used to calculate the annual release reports.

Maintenance/calibration of the monitoring equipment is performed according to written procedures.

7.1.3 Cold Vacuum Drying Facility

The following sections describe the emission monitoring system. The CVDF stack is a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr.

7.1.3.1 System Functions

The stack monitoring (SM) system is a system for monitoring the particulate released from the CVDF exhaust stack effluent. The primary purpose of the system is to continuously collect particulate on fixed media for later laboratory analysis and to provide documentation of emissions. Additionally, the SM system provides on-line indication of alpha and beta particulate, stack flow, and temperature. Warning of off-normal radioactive emissions, stack flow, or temperature are annunciated locally. Remote alarm and monitored parameters are provided to the control room via the Monitoring and Control System (MCS).

Figure 7.2. Venting Arrangement For Air Sparge Of Vessels

7.1.3.2 Basic Operational Overview

The CVDF SM system is a gaseous-effluent monitoring system. It is composed of a microprocessor-based particulate monitor and particulate collector that is mounted in a two-component, open-frame skid and cabinet assembly. The system consists of an active monitoring train and a record sampling train. The primary purpose of the record sampling train is to collect particulate effluent on fixed media for later laboratory analysis and documentation of emissions. The active monitoring train is designed to provide on-line indication of alpha and beta particulates in the CVDF heating, ventilation, and air conditioning (HVAC) ventilation exhaust stack. The system provides warning of off-normal emissions as measured by the active monitoring train. Visual display and alarm indications and contact output for remote alarms are provided for high radiation and failure conditions. Analog and digital outputs are provided to the MCS.

A computer data logging system is also provided to record monitored functions for later data download, as needed.

The SM system includes: stack sample extraction probe assembly and heated transport piping; sampler skid assembly with record sampler and on-line alpha/beta monitors; redundant sample vacuum pumps; auxiliary instrumentation, including stack flow rate and temperature, and sample flow rates and temperature; a control console with electrical power interface, microprocessor, and MCS interface; and local alarm indication. The stack monitor skid is located in the CVDF mechanical equipment room near the exhaust stack. Piping to and from the stack to the skid is routed in a structural steel support assembly. See Figures 7.3, 7.4, and 7.5 for details of this system.

The SM system receives power via the facility uninterruptible power supply (UPS). Upon loss of normal facility power, the UPS is powered from a standby power system.

The sample extraction position is at an elevation on the stack of approximately 32 ft. The sample transport line connects to the probe at this position and traverses down and outward to the mechanical room where it connects to the SM sampler line on the equipment skid. Included in the sample transport tube support tray are the dynamic and static pressure lines with heat trace cable and insulation for the flow measurement system and a 3/4" conduit for the flow temperature sensing element wiring. The sample transport line is also heat traced and insulated.

7.1.3.3 Principles of Operation

7.1.3.3.1 Exhaust Stack Parameter Monitoring. Instrumentation to monitor stack flow and temperature are provided with the SM system equipment package. The flow pressure taps and temperature measurement locations are close together on the main stack at a height of approximately 37.5 ft. (Roughly 6 ft. above the sample extraction probe.) A differential pressure flow device (pitot or dynamic pressure minus static pressure) that is located on the equipment skid will be used to determine flow rate within approximately two percent. The flow temperature is measured using a stack mounted sensing element.

Figure 7.3. Simplified Sketch of Equipment CSB and CVDF

Figure 7.4. Stack Monitoring System – CSB and CVDF

Figure 7.5. Monitoring Equipment and Duct Layout - CVDF

7.1.3.3.2 Effluent Sample Delivery System. The effluent sample delivery system is composed of the following: the shrouded sample extraction probe located on the main stack at an elevation of 32 ft.; the 1 ½ inch heat-traced sample line running from the extraction probe to the equipment skid; and on the equipment skid, a sample stream temperature measuring element; and a flow-splitter to deliver equal sample flow to two monitoring legs. The sample flows from the stack passing through the sampling legs is produced by either of two redundant vacuum pumps that are controlled by the vacuum pump control module. Flow alarms are audibly and visually annunciated locally and remotely via the MCS system. The flow data from the sample line controllers are sent to the integrated control console equipment where they are totalized. The outflow from the vacuum pumps is returned to the stack.

7.1.3.3.3 Record Sampler. Following the flow-splitter, one leg of the sample stream goes to the record sampler and one goes to the on-line monitors. The record sampler contains a 47 mm diameter filter (Gelman Versaport 3000H, or equivalent). Particulates are deposited on the filter and the gaseous component(s) pass through.

Periodically by procedure, or as required by differential pressure drop, the sample collection filter and cartridge are changed. Since the sample stream is mass flow controlled, the flow volume for the collection period, in terms of standard conditions, can be determined at that time. The stack flow totalizer is also read at the time the filters are changed. The accumulated radioactivity determined from the record sample by laboratory analysis can then be given as a concentration (i.e. $\mu\text{Ci/cc}$) in the sample stream. This, in turn, can be related to the stack total emission by the ratio of the sample to stack flow and other factors. The result will be used in computing annual airborne emissions.

7.1.3.3.4 On-Line Monitors. The other leg of the sample stream is routed to an on-line monitor. The on-line monitor can provide essentially the same information as the record sampler, albeit with less accuracy. Given the stack mass flow, the sample mass flow through the on-line monitors, the monitored radioactive count accumulation by each detector, and the detection efficiency for each detector (the detection efficiency is to be provided by the manufacturer), the SM's integrated control console microprocessor then calculates the sampled activity in terms of concentration (i.e., $\mu\text{Ci/cc}$). This information can be related to stack emission.

7.1.3.3.5 Alpha-Beta Particulate On-Line Monitors. The system contains a monitor for the concurrent monitoring of alpha and beta particulate emitters. This monitor utilizes a scintillation detector positioned to measure the radiological particulate build-up on a 47mm diameter filter (again, Gelman Versaport 3000H, or equivalent). This detector consists of a two-inch diameter photomultiplier tube optically coupled to a two mm thick NE-102 plastic (terphenyl-in-polyvinyltoluene) scintillation crystal to which a ZnS decal phosphor is attached. The alpha particles are converted to light pulses by the ZnS phosphor and the beta particles are converted to light pulses by the plastic detector. These extremely weak light scintillations are converted to electronic pulses by the photomultiplier tube. They are then sent to a skid-mounted preamplifier, and subsequently, to the rate meter in the integrated control console. Since these detected electronic signals can be either alpha or beta count pulses, they must be separated by the

microprocessor controlled rate meter according to their characteristic pulse shape. The system manufacturer indicates there is essentially no count crossover from the alpha channel to the beta channel and only a two percent count crossover from the beta channel to the alpha channel. Thus, both alpha counts and beta counts are accumulated accurately and separately.

7.1.3.3.6 Radiation Alarms. A high radiation alarm is generated if the on-line particulate monitor (either or both the alpha or beta channels) count rate reach a predetermined set-point. The local alarm consists of a fast ringing bell and a red flashing light. A common failure (low-count) alarm is also annunciated locally. These alarms are passed to the MCS as a digital input.

Maintenance/calibration of the ventilation and stack monitoring systems is performed according to written procedures.

7.1.4 Canister Storage Building

The following sections describe the emission monitoring system. The CSB stack is a "major stack," i.e. one with a potential-to-emit greater than 0.1 mrem/yr.

7.1.4.1 System Functions

The CSB SM system is a system for monitoring the particulate released from the CSB exhaust stack effluent. The primary purpose of the system is to continuously collect particulate on fixed media for later laboratory analysis and to provide documentation of emissions. Additionally, the SM system provides on-line indication of alpha and beta particulate, stack flow, and temperature. Warning of off-normal radioactive emissions, stack flow, or temperature are annunciated locally. Remote alarm and monitored parameters are provided to the control room via the Distributed Control System (DCS).

7.1.4.2 Basic Operational Overview

The CSB SM system is a gaseous-effluent monitoring system. It is composed of a microprocessor-based particulate monitor and particulate collector that is mounted in a two-component, open-frame skid and cabinet assembly. The system consists of an active monitoring train and a record sampling train. The primary purpose of the record sampling train is to collect particulate effluent on fixed media for later laboratory analysis and documentation of emissions. The active monitoring train is designed to provide on-line indication of alpha and beta particulates in the CSB HVAC ventilation exhaust stack. The system provides warning of off-normal emissions as measured by the active monitoring train. Visual display and alarm indications and contact output for remote alarms are provided for high radiation and failure conditions. Analog and digital outputs are provided to the DCS.

A computer data logging system is also provided to record monitored functions for later data download, as needed.

The SM system includes: stack sample extraction probe assembly and heated transport piping; sampler skid assembly with record sampler and on-line alpha/beta monitors; redundant sample

vacuum pumps; auxiliary instrumentation, including stack flow rate and temperature, and sample flow rates and temperature; a control console with electrical power interface, microprocessor, and DCS interface; and local alarm indication. The stack monitor skid is located in the CSB mechanical equipment room near the exhaust stack. Piping to and from the stack to the skid is routed in a structural steel support assembly. See Figure 7.3, 7.4 and 7.6 for details of this system. The SM system receives power from the facility power system.

The sample extraction position is at an elevation on the stack of approximately 26 ft. The sample transport line connects to the probe at this position and traverses down and outward to the mechanical room where it connects to the SM sampler line on the equipment skid. Included with the sample transport tube are the dynamic and static pressure lines with heat trace cable and insulation for the flow measurement system.

7.1.4.3 Principles of Operation

7.1.4.3.1 Exhaust Stack Parameter Monitoring. Instrumentation to monitor stack flow and temperature are provided with the SM system equipment package. The flow pressure taps and temperature measurement locations are close together on the main stack at a height of approximately 46.5 ft. (Roughly 20 ft. above the sample extraction probe.) A differential pressure flow device (pitot or dynamic pressure minus static pressure) that is located on the equipment skid will be used to determine flow rate within approximately two percent. The flow temperature is measured using a stack mounted sensing element.

7.1.4.3.2 Effluent Sample Delivery System. The effluent sample delivery system is composed of the following: the shrouded sample extraction probe located on the main stack at an elevation of 26 ft.; the 1 ½ inch heat-traced sample line running from the extraction probe to the equipment skid; and on the equipment skid, a sample stream temperature measuring element; and a flow-splitter to deliver equal sample flow to two monitoring legs. The sample flows from the stack passing through the sampling legs is produced by either of two redundant vacuum pumps that are controlled by the vacuum pump control module with mass flow alarms controllers. Flow alarms are audibly and visually annunciated locally and remotely via the DCS system. The flow data from the sample line controllers are sent to the integrated control console equipment where they are totalized. The outflow from the vacuum pumps is returned to the stack.

7.1.4.3.3 Record Sampler. Following the flow-splitter, one leg of the sample stream goes to the record sampler and one goes to the on-line monitors. The record sampler contains a 47 mm diameter filter (Gelman Versaport 3000H, or equivalent). Particulates are deposited on the filter and the gaseous component(s) pass through.

Periodically by procedure, or as required by differential pressure drop, the sample collection filter and cartridge are changed. Since the sample stream is mass flow controlled, the flow volume for the collection period, in terms of standard conditions, can be determined at that time. The stack flow totalizer is also read at the time the filters are changed. The accumulated radioactivity determined from the record sample by laboratory analysis can then be given as a concentration (i.e. $\mu\text{Ci/cc}$) in the sample stream. This, in turn, can be related to the stack total emission by the ratio of the sample to stack flow and other factors. The result will be used in computing annual airborne emissions.

Figure 7.6. Heating, Ventilation, and Air Conditioning System Composite Diagram

7.1.4.3.4 On-Line Monitors. The other leg of the sample stream is routed to an on-line monitor. The on-line monitor can provide essentially the same information as the record sampler, albeit with less accuracy. Given the stack mass flow, the sample mass flow through the on-line monitors, the monitored radioactive count accumulation by each detector, and the detection efficiency for each detector (the detection efficiency is to be provided by the manufacturer), the DCS then calculates the sampled activity in terms of concentration (i.e., $\mu\text{Ci/cc}$). This information can be related to stack emission.

7.1.4.3.5 Alpha-Beta Particulate On-Line Monitors. The system contains a monitor for the concurrent monitoring of alpha and beta particulate emitters. This monitor utilizes a scintillation detector positioned to measure the radiological particulate build-up on a 47mm diameter filter (again, Gelman Versaport 3000H, or equivalent). This detector consists of a two-inch diameter photomultiplier tube optically coupled to a two mm thick NE-102 plastic (terphenyl-in-polyvinyltoluene) scintillation crystal to which a ZnS decal phosphor is attached. The alpha particles are converted to light pulses by the ZnS phosphor and the beta particles are converted to light pulses by the plastic detector. These extremely weak light scintillations are converted to electronic pulses by the photomultiplier tube. They are then sent to a skid-mounted preamplifier, and subsequently, to the rate meter in the integrated control console. Since these detected electronic signals can be either alpha or beta count pulses, they must be separated by the microprocessor controlled rate meter according to their characteristic pulse shape. The system manufacturer indicates there is essentially no count crossover from the alpha channel to the beta channel and only a two percent count crossover from the beta channel to the alpha channel. Thus, both alpha counts and beta counts are accumulated accurately and separately.

7.1.4.3.6 Radiation Alarms. A high radiation alarm is generated if the on-line particulate monitor (either or both the alpha or beta channels) count rate reach a predetermined set-point. The local alarm consists of a fast ringing bell and a red flashing light. A common failure (low-count) alarm is also annunciated locally. These alarms are passed to the DCS as a digital input.

Maintenance/calibration of the ventilation and stack monitoring systems is performed according to written procedures.

7.2 INSTRUMENT DESCRIPTION/SPECIFICATION FOR LIQUID

7.2.1 Outfall 004 Point Discharge

Monitoring is performed by grab sample composite sampling, and continuously monitoring flow. This flow monitor is a generic monitor that meets the requirement of the permit

7.2.2 Outfall 004 Stormwater

This system is monitored by having a grab sample obtained during flow. Since there is insufficient flow, a bucket has been placed in a stormwater inlet to get this sample when there is sufficient flow.

7.2.3 Outfall 003 Point Discharge

Monitoring is performed by grab sample.

7.2.4 Other Liquid Discharges

The septic systems and groundwater discharge are not monitored. Their releases are controlled by administrative procedure to make sure these discharges meet state standards.

7.2.5 Equipment Operation

Maintenance/calibration of the liquid monitoring equipment is performed according to written procedures.

7.3 TECHNICAL SPECIFICATIONS PERTAINING TO THE EFFLUENT MONITORING

There are no technical specification requirements associated with the design or operation of the effluent (airborne emissions and liquid discharges) based on the SNF Project Authorization Basis documentation (HNF-3553).

7.4 ALTERNATIVE MONITORING AND ASSESSMENT METHODS

7.4.1 Air

The only facility for which "alternative monitoring" methods occur which are different than those specified in 40 CFR 61, Appendix D is the 105 KW IWTS Air Sparge vent. This "alternative monitoring" method is described in Section 7.1.2 and has been approved by EPA (letter A. J. Frankel to J. E. Rasmussen, dated November 4, 1998).

7.4.2 Liquid

The outfalls are grab sampled and there is no alternative monitoring. The flow rate for Outfall 004 can be determined by a weir that has been calibrated to measure the flow.

8.0 HISTORICAL MONITORING/SAMPLING DATA FOR EFFLUENT STREAMS

8.1 NORMAL CONDITIONS

Historical monitoring/sampling data representative of normal operations is described below for those facilities that have operated and abated NOC emissions are being used as the normal operational releases. For these facilities that are not operational until actual data from operations is available.

The characteristics of effluents from the SNF Project facilities are described in Tables 4.1 and 4.2. Based on that information it is concluded that only the radiological effluent releases will be described. Radioactive airborne and liquid discharge data are included in Tables 8-1 through 8-7.

Table 8-1. 105 KE Airborne Effluent Releases.

Radionuclide	Sample Point	Annual 1998 Emission DOE-RL-99-41 (Ci/yr)
⁹⁰ Sr	Vent Exhaust	1.4E-05
¹³⁷ Cs	Vent Exhaust	2.6E-05
²³⁸ Pu	Vent Exhaust	5.1E-07
^{239/240} Pu	Vent Exhaust	3.1E-06
²⁴¹ Am	Vent Exhaust	1.9E-06
²⁴¹ Pu	Vent Exhaust	3.8E-05
Total		8.4E-05

Table 8-2. 105 KW Airborne Effluent Releases.

Radionuclide	Sample Point	Annual 1998 Emission DOE-RL-99-41 (Ci/yr)
⁹⁰ Sr	Vent Exhaust	4.2E-07
¹³⁷ Cs	Vent Exhaust	3.9E-06
²³⁸ Pu	Vent Exhaust	6.1E-10
^{239/240} Pu	Vent Exhaust	2.3E-08
²⁴¹ Am	Vent Exhaust	4.1E-08
²⁴¹ Pu	Vent Exhaust	3.4E-07
Total		4.7E-06

Table 8-3. 105 KW Airborne Effluent Release Air Sparging IWTS.

Radionuclide	Sample Point	Projected Annual Abated Emission DOE/RL-98-02, Rev. 0 (Ci/yr)
⁶⁰ Co	Stack Exhaust	1.87E-05
⁹⁰ Sr	Stack Exhaust	4.4E-02
¹⁰⁶ Ru	Stack Exhaust	4.85E-06
¹²⁵ Sb	Stack Exhaust	1.56E-04
¹³⁴ Cs	Stack Exhaust	8.68E-05
¹³⁷ Cs	Stack Exhaust	5.66E-02
¹⁵⁴ Eu	Stack Exhaust	4.74E-04
¹⁵⁵ Eu	Stack Exhaust	9.69E-05
²³⁸ Pu	Stack Exhaust	4.32E-04
^{239/240} Pu	Stack Exhaust	1.30E-03
²⁴¹ Pu	Stack Exhaust	2.55E-02
²⁴¹ Am	Stack Exhaust	1.41E-03
Total		1.30E-01

Table 8.4. Cold Vacuum Drying Facility Airborne Effluent Releases	
Radionuclide	Projected Annual Abated Emission DOE/RL-96-110, Rev. 1 Annual Release (Ci/yr)
H-3	7.13E-00
H-3	6.10E-06
C-14	1.35E-01
C-14	1.15E-07
Fe-55	5.55E-07
Co-60	1.19E-06
Ni-59	1.24E-08
Ni-63	1.35E-06
Se-79	2.60E-08
Kr-85	1.15E+02
Kr-85	9.83E-05
Sr-89	0.00E+01
Sr-90	3.05E-03
Y-90	3.05E-03
Y-91	6.72E-24
Zr-93	1.21E-07
Zr-95	5.10E-22
Nb-93m	7.45E-08
Nb-95	1.13E-21
Nb-95m	3.77E-24
Tc-99	8.68E-07
Ru-103	0.00E+01
Ru-106	5.49E-07
Rh-103m	0.00E+01
Rh-106	5.49E-07
Pd-107	4.91E-09
Ag-110	8.56E-14
Ag-110m	6.45E-12
Cd-113m	1.07E-06
Cd-115m	0.00E+01
In-113m	6.45E-17
Sn-113	6.45E-17
SN-119m	8.96E-11
Sn-121m	2.40E-08
Sn-123	5.25E-15
Sn-126	4.70E-08

Table 8.4. Cold Vacuum Drying Facility Airborne Effluent Releases	
Radionuclide	Projected Annual Abated Emission DOE/RL-96-110, Rev. 1 Annual Release (Ci/yr)
Sb-124	9.14E-28
Sb-125	1.01E-05
Sb-126	6.57E-09
Sb-126m	4.70E-08
Te-123m	8.23E-21
Te-125m	2.47E-06
Te-127	2.86E-16
Te-127m	2.92E-16
Te-129	0.00E+01
Te-129m	0.00E+01
I-129	1.24E-03
I-129	1.06E-09
Cs-134	4.79E-06
Cs-135	2.34E-08
Cs-137	3.98E-03
Ba-137m	3.77E-03
Ce-141	0.00E+01
Ce-144	2.76E-07
Pr-143	0.00E+01
Pr-144	2.72E-07
Pr-144m	3.32E-09
Pm-147	1.39E-04
Pm-148	0.00E+01
Pm-148m	0.00E+01
Sm-151	5.31E-05
Eu-152	2.85E-07
Eu-154	3.23E-05
Eu-155	6.66E-06
Gd-153	3.86E-14
Tb-160	8.35E-25
U-234	2.64E-07
U-235	1.02E-08
U-236	3.83E-08
U-238	2.10E-07
Np-237	1.72E-08
Pu-238	3.35E-05
Pu-239	6.57E-05
Pu-240	3.59E-05

Table 8.4. Cold Vacuum Drying Facility Airborne Effluent Releases	
Radionuclide	Projected Annual Abated Emission DOE/RL-96-110, Rev. 1 Annual Release (Ci/yr)
Pu-241	2.01E-03
Pu-242	1.66E-08
Am-241	1.13E-04
Am-242	5.88E-08
Am-242m	5.91E-08
Am-243	3.62E-08
Cm-242	4.88E-08
Cm-244	4.34E-07
Total	1.22E+02

Table 8-5. Canister Storage Building Airborne Effluent Releases.

Radionuclide	Sample Point	Projected Annual Abated Emission DOE/RL-98-30, Rev. 0 (Ci/yr)
^3H	Stack Exhaust	4.38E+01
^3H	Stack Exhaust	1.16E-05
^{14}C	Stack Exhaust	8.28E-01
^{14}C	Stack Exhaust	2.20E-07
^{60}Co	Stack Exhaust	6.67E-06
^{85}Kr	Stack Exhaust	7.24E+02
^{85}Kr	Stack Exhaust	1.92E-04
^{90}Sr	Stack Exhaust	1.63E-02
^{90}Y	Stack Exhaust	1.63E-02
^{125}Sb	Stack Exhaust	5.65E-05
$^{125\text{m}}\text{Te}$	Stack Exhaust	1.38E-05
^{129}I	Stack Exhaust	7.41E-03
^{129}I	Stack Exhaust	1.97E-09
^{134}Cs	Stack Exhaust	2.81E-05
^{137}Cs	Stack Exhaust	2.10E-02
$^{137\text{m}}\text{Ba}$	Stack Exhaust	1.98E-02
^{147}Pm	Stack Exhaust	8.18E-04
^{151}Sm	Stack Exhaust	2.80E-04
^{154}Eu	Stack Exhaust	1.68E-04
^{155}Eu	Stack Exhaust	3.63E-05
^{234}U	Stack Exhaust	1.47E-06
^{235}U	Stack Exhaust	5.66E-08
^{236}U	Stack Exhaust	2.11E-07
^{238}U	Stack Exhaust	1.16E-04
^{238}Pu	Stack Exhaust	2.03E-04
^{239}Pu	Stack Exhaust	3.75E-04
^{240}Pu	Stack Exhaust	2.16E-04
^{241}Pu	Stack Exhaust	1.06E-02
^{241}Am	Stack Exhaust	5.76E-04
Totals		7.69E+02

Table 8-6. 1706 KE Airborne Effluent Releases.

Radionuclide	Sample Point	Annual 1998 Emission DOE/RL-99-41 (Ci/yr)
Total Alpha	Vent Exhaust	1.9E-07
Total Beta	Vent Exhaust	7.8E-07
Total		9.7E-07

Table 8-7. 1908KE Outfall Effluent Releases

Radionuclide	Sample Point	Annual 1998 Release HNF-EP-0527-8 (Ci/yr)
90 Sr	Outfall 004	2.4E-04
^{239,240} Pu	Outfall 004	1.3E-06
²⁴¹ Am	Outfall 004	1.7E-05
Total Alpha	Outfall 004	1.0E-04
Total Beta	Outfall 004	5.9E-04
Total		9.5E-04

8.2 Unplanned operating conditions

Characterization of radiological airborne and liquid discharges under upset/accident conditions is described in the SNF Project Final Safety Analysis Report, HNF-3553.

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9.0 SAMPLE ANALYSIS

9.1 ANALYTICAL LABORATORY AND PROCEDURES

The requirements for which laboratory analyses are performed and reported for airborne and liquid effluent discharges are identified in the following:

- WHC-EP-0446-2, "Quality Assurance Project Plan for the Facility Effluent Monitoring Plan Activities"
- HNF-EP-0528-3, "NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions"
- HNF-0835-5, "Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Effluent and Environmental Program During Calendar Year 1999."
- Waste Management Hanford Sampling Authorization Form provides EPA reference methods to the laboratory.

9.2 SAMPLE AND DATA CHAIN OF CUSTODY

The means by which sample and data chain of custody is performed by the following forms:

- SNF Project Chain of Custody Form
- Chain-of Custody Form – NPDES

Data Custody is controlled by SNF Project EP-5-016 Environmental Effluent Data Handling.

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10.0 NOTIFICATION AND REPORTING REQUIREMENTS

Notification and reporting requirements are imposed by federal and state law as well as by DOE orders and permits. This section identifies the reporting requirements and their bases

10.1 REPORTING REQUIREMENTS

Reporting requirements are derived from the following:

40 CFR 61

40 CFR 122

40 CFR 300

WAC 246-247

DOE Order 232.1

DOE Order 5400.1

10.2 PROCEDURES USED TO IMPLEMENT THE NOTIFICATION AND REPORTING REQUIREMENTS

10.2.1 Hanford General

- HNF-PRO-453 Spill and Release Reports

This procedure establishes the notification requirements in the event of a spill, release, permit condition violation, standard exceedance, or other federal, state, or local code compliance condition that triggers notification to any offsite agency(s). These requirements apply to certain fires, all explosions, all permit condition exceedances or standard violations, out-of-date calibration of environmental radiation air monitoring equipment, and any unintentional or intentional nonpermitted spill or release of a solid; semi-solid; liquid, or airborne substance involving radioactive, hazardous, or dangerous waste; hazardous or extremely hazardous substance; gas release event; asbestos; pesticides; herbicides; rodenticides, polychlorinated biphenyls (PCB); PCB leaking light ballasts; sewage; nonregulated and regulated oil; and petroleum derivatives released to the environment and/or inside facility buildings or structures.

- HNF-PRO-060, Reporting Occurrences and Processing Operations Information

This procedure establishes the reporting process for: operational emergencies, abnormal events, and occurrence reporting. SNF Project facility managers shall provide timely notification of events and conditions to the Occurrence Notification Center.

- HNF-PRO- 450, Radioactive Air Emissions

This procedure describes the reporting requirements and process for startup testing, startup, and annual reporting.

- HNF-PRO-3679, Effluent and Environmental Monitoring

This procedure contains requirements and guidance for preparing and documenting effluent monitoring results.

10.2.2 Spent Nuclear Fuel Project Specific

- AP-MS-2-015, Occurrence Reporting and Processing of Operations Information. This administrative procedure (AP) implements the requirements of the U.S. Department of Energy (DOE) Orders 232.1A and 5480.19, and the requirements of Project Hanford Management Contract procedures HNF-PRO-060 and HNF-PRO-453, by identifying the facility specific reporting requirements of the SNF Project, Operations organization. The purpose of this procedure is to provide for the timely reporting of occurrences to the DOE and FH.

This procedure applies to all Operations facility-specific SNF Project activities associated with the reporting and processing of occurrence reports concerning events or conditions that could have adverse implications for safety, health, environment, quality assurance, security, or operations.

- AP-EP-5-008 Notification to Environmental Regulatory Agencies. This procedure provides the notification actions required for: 1) non-routine releases to the environment as indicated by above-limits results from air and liquid effluent sampling at the SNF Project facilities and 2) facility upset conditions that may affect environmental releases. This procedure provides supplemental instruction beyond those requirements contained in DOE Order 232.1A, SNF Project AP MS-2-015 and HNF-PRO-453.

The scope of this procedure includes specific non-routine releases to the environment from regulated air/liquid discharge points at the SNF Project facilities as well as facility upset conditions that may affect environmental releases.

Non-routine environmental releases of airborne and liquid effluents are determined by exceedances of measurement/monitoring criteria and thresholds established by permits, clean air requirements, and water quality regulations. This procedure may encompass radioactive spills that are also evaluated and reported per HNF-PRO-453 for the purpose of making additional notifications.

- AP-EP-5-016, Environmental Effluent Data Handling

This procedure provides instructions for obtaining and managing environmental radiological effluent (air and water) data and providing input to site-wide effluent reports.

11.0 INTERFACE WITH NEAR-FACILITY MONITORING

11.1 DESCRIPTION

The sitewide Environmental Monitoring Plan, DOE/RL-91-50, Rev. 1, consists of two distinct but related components; environmental surveillance conducted by Pacific Northwest National Laboratories (PNNL), near-facility environmental monitoring (NFM) conducted by Waste Management Federal Services, and effluent monitoring conducted by the FH team. Environmental surveillance, conducted by PNNL, consists of surveillance of all environmental parameters to demonstrate compliance with regulations. Effluent monitoring includes in-line and facility effluent monitoring. NFM is performed to identify areas of noncompliance with regard to loss of contamination control.

11.2 PURPOSE

NFM provides facility-specific environmental monitoring to monitor the environment adjacent to facilities under the responsibility of the FH team and to assess the impact (spread of contamination) on the environment immediately adjacent to a facility.

The objectives of the NFM are to evaluate the following:

- Compliance with DOE, EPA, Ecology, DOH, and internal FH team environmental radiation protection requirements and guides
- Performance of radioactive waste confinement systems
- Trends of radioactive materials in the environment at and adjacent to nuclear facilities and waste disposal site.

The purpose and justification for the NFM include the following:

- The NFM provides a level of assurance to the FH team that the effluent and contamination controls for various facilities and waste sites are effective.
- A secondary aspect of the NFM is additional assurance beyond that provided by the Occupational Health and Safety Program that it is safe to work onsite and for visitors to safely tour the site.

11.3 GROUNDWATER MONITORING FOR K AREA

Groundwater monitoring at 100 K Area is covered by "Groundwater Monitoring and Assessment Plan for the 100 K Area Fuel Storage Basins," WHC-SD-EN-AP-174, Rev. 0, 1995. The purpose of this plan is to ensure compliance with DOE groundwater protection and monitoring requirements for nuclear fuel and waste storage facilities per DOE Order 5400.1

11.4 REPORTS

Results of the NFM are published in annual reports, for example, "Environmental Releases for Calendar year 1998," HNF-EP-0527-8, "Near Facility Environmental Monitoring Annual Report, Calendar year 1997, PNNL-12088, App. 2, and "Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 1999," in DOE/RL-2000-41.

12.0 QUALITY ASSURANCE

12.1 PURPOSE

The SNF Project QA program is described in the following documents:

- WHC-EP-0446, Rev. 2, Quality Assurance Project Plan for Facility Effluent Monitoring Plan Activities (Liquid Effluents)
- 40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAPS) (Air Emissions)
- HNF-EP-0528-3, NESHAP Quality Assurance Project Plan for Radioactive Air Emissions Data (Air Emissions)

12.2 OBJECTIVE

The objective of the above is to provide a documented QA plan describing QA requirements for implementing FEMP activities at the SNF Project facilities. This documented program covers the following: organizational responsibilities, program design, procedures, field quality control, laboratory quality control, human factors, recordkeeping, chain-of-custody procedures, audits, performance reporting, and, independent data verification

12.3 REQUIREMENTS

The above three documents have been developed to implement the overall QA program requirements for radioactive liquid/airborne emissions data collection and reporting activities. The above documents are Quality Assurance Program Plan which applies specifically to the field activities, laboratory analyses, and continuous monitoring performed for all FEMPs by the FH team.

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13.0 INTERNAL AND EXTERNAL PLAN REVIEW

The General Environmental Protection Program, DOE Order 5400.1, Chapter IV.4 (DOE 1988), requires that the FEMP be reviewed annually and updated every three years. The FEMP should be reviewed and updated as necessary after each major change or modification in the facility processes, facility structure, ventilation and liquid collection systems, monitoring equipment, waste treatment, or a significant change to the Safety Analysis Reports. In addition, EPA regulations require that records on the results of radioactive airborne emissions monitoring be maintained onsite for five years. Operations management shall maintain records of measurements of stack particulates or other nonradioactive hazardous pollutant emissions for three years. Facility operators will have to determine on a semiannual basis that no changes in operations that would require additional measurements have occurred.

FH prepares an annual effluent discharge report for each area on the Hanford Site to cover both airborne and liquid release pathways..

Facility management is to obtain the FH function's approval for all changes to the FEMPs, including those generated in the annual review and update. In addition, the FEMP shall be reviewed by others if determined by FH.

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14.0 COMPLIANCE ASSESSMENT

A compliance assessment of the applicable regulations in Section 3 and the effluent monitoring systems described in Section 7 have been performed are documented in the following assessments:

SNF Project Standards/Requirements Identification Document (HNF-SD-SNF-RD-001)
Phase 1 and Phase 2 Assessments, Functional Area 20: Environmental Protection

Management Self Assessments (MSA) for Operational Readiness Review:

Objective No.: 16.0.S.c

Criteria No: 16.0.S.c.1

“The environmental permits required for operations are in place. Facility specific permit conditions and limitations and other applicable site wide permit conditions and limitations are clearly defined in appropriate documentation. Those conditions and limitations have been field verified to confirm they are being implemented.”

2K201	K Basin
2K202	CVDF
2K203	CSB

Based on these assessments, there are no SNF Project effluent streams out of compliance with the requirements

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15.0 SUMMARY AND CONCLUSIONS

Airborne and liquid effluent monitoring systems at SNF Project facilities are in place and are in compliance with applicable requirements with the exception of the stack monitoring system at the CVDF. Startup testing of that system has not yet been completed.

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16.0 REFERENCES

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- 40 CFR 82, 1992, "Protection of Stratospheric Ozone," *Code of Federal Regulations*, as amended
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