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# Facility Effluent Monitoring Plan for the 2724-W Protective Equipment Decontamination Facility

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Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930



Approved for Public Release

WHC-EP-0471

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G. J. Carter

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## APPROVAL PAGE

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# 2724 PROTECTIVE EQUIPMENT DECONTAMINATION FACILITY FACILITY EFFLUENT MONITORING PLAN

J. M. Nickels

## ABSTRACT

*A facility effluent monitoring plan is required by the U.S. Department of Energy in DOE Order 5400.1* for any operations that involve hazardous materials and radioactive substances that could impact employee or public safety or the environment. This document is prepared using the specific guidelines identified in* A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans, WHC-EP-0438**. *This facility effluent monitoring plan 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 first annual report. It shall ensure long-range integrity of the effluent monitoring systems by requiring an update whenever a new process or operation introduces new hazardous materials or significant radioactive materials. This document must be reviewed annually even if there are no operational changes, and it must be updated as a minimum every three years.*

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*General Environmental Protection Program, *DOE Order 5400.1, U.S. Department of Energy, Washington, D.C., 1988.*

**A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans, *WHC-EP-0438, Westinghouse Hanford Company, Richland, Washington, 1991.*

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| | |
|---|---|
| ALARA | as low as reasonably achievable |
| CERCLA | *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* |
| CFR | Code of Federal Regulations |
| DCG | Derived Concentration Guides |
| DLF | Decontamination Laundry Facility |
| DOE | U.S. Department of Energy |
| DOP | dioctyl phthalate |
| ECL | environmental control limit |
| Ecology | Washington Department of Ecology |
| EMP | Effluent Monitoring Plan |
| EPA | Environmental Protection Agency |
| FEMP | Facility Effluent Monitoring Plan |
| HEPA | high-efficiency particulate air (filter) |
| NESHAP | *National Emissions Standards for Hazardous Air Pollutants* |
| PEDF | Protective Equipment Decontamination Facility |
| PNL | Pacific Northwest Laboratory |
| QA | Quality Assurance |
| QAPP | Quality Assurance Project Plan |
| RWP | Radiation Work Procedure |
| SARA | *Superfund Amendments and Reauthorization Act of 1986* |
| TLD | Thermoluminescent Dosimetry |
| Tri-Party Agreement | *Hanford Federal Facility Agreement and Consent Order* |
| WAC | Washington Administrative Code |
| Westinghouse Hanford | Westinghouse Hanford Company |

# 2724-W PROTECTIVE EQUIPMENT DECONTAMINATION FACILITY FACILITY EFFLUENT MONITORING PLAN

## 1.0 INTRODUCTION

The Facility Effluent Monitoring Plan (FEMP) for the 2724-W Protective Equipment Decontamination Facility (PEDF), also known as the Laundry Facility shall provide sufficient information on the effluent characteristics and the sampling system so that a compliance assessment may be performed against requirements.

This plan has been prepared according to the Westinghouse Hanford Company (Westinghouse Hanford) guidelines (WHC 1991a) and is intended to be a stand-alone document with limited effluent data and information, incorporated by reference. By utilizing the Westinghouse Hanford preparation guide for FEMPs, this plan addresses the PEDF specific sampling system.

### 1.1 POLICY

The U.S. Department of Energy (DOE) and Westinghouse Hanford conducts effluent monitoring that demonstrates that the public and the environment are adequately protected during DOE Operations and that operations are in compliance with DOE and other applicable federal, state, and local radiation and hazardous material standards and requirements. It is also DOE and Westinghouse Hanford policy that effluent monitoring programs meet high standards of quality and credibility.

### 1.2 PURPOSE

This plan fulfills the DOE requirement (DOE 1988) for a FEMP for the PEDF which contains hazardous materials having the potential to impact the health and safety of the employees, public, and environment.

### 1.3 SCOPE

This document includes program plans for monitoring and characterizing radioactive and nonradioactive hazardous materials discharged in DOE facility effluents. This plan includes complete documentation for gaseous and liquid effluent monitoring for both radioactive and nonradioactive hazardous pollutants that could be discharged under routine and/or upset conditions.

## 1.4 DISCUSSION

The Laundry Facility provides a service to its customers by receiving only cleanable items, not waste material. Unique to the Laundry Facility, its effluent constituents are generated at the customers location and cannot be tracked in a material balance from a source to the point of discharge. Radiation work procedure (RWP) and ethical work practices (DOE 1990a) are required at the customers facility to maintain acceptable levels of radioactivity. Based on operating record data, a hazard analysis has determined this facility to be a low hazard nuclear facility. Because there is radionuclide inventory within the facility, it is necessary to verify the monitoring program addresses all pertinent constituents at the point of discharge.

As for the nonradioactive constituents, the wastewater characterization report (WHC 1990) documents that this wastewater stream is not a dangerous waste, based on Washington Administrative Code (WAC) 173-303 (Ecology 1989a). The facility preventative capabilities of engineered and administrative control barriers will be discussed but are not required according to state codes because this is not a dangerous waste stream.

# 2.0 FACILITY DESCRIPTION

## 2.1 BRIEF FACILITY PHYSICAL DESCRIPTION

The PEDF is located in the 200 West Area of the Hanford Site, which is located in the south central region of Washington State. The original building was a wood and concrete structure constructed in 1952. It has subsequently been expanded using prefabricated metal buildings and mobile offices.

The current complex is one level and covers approximately 2,250 $m^2$ (25,000 $ft^2$) of connected buildings (2724-W, 2724-WA, 2724-WB, and MO-406). There are separate process areas for radioactive and for nonradioactive washing and drying in Building 2724-W. The remaining buildings are for laundry finishing tasks, storage, change rooms, offices, and a lunchroom. Mask cleaning and repair operations are performed in mobile office complex (MO-412), which is adjacent to the Laundry Facility and referred to as the mask station. A location diagram of the PEDF can be seen in Figure 2-1.

All respirators used on the Hanford Site are sanitized using a commercial dish washer and repaired by certified operators at the mask station, a 6-wide portable trailer located directly east of Building 2724-W. The trailers were installed in 1984 to provide approximately 486 $m^2$ (5,400 $ft^2$) of process area. The major areas of this facility are a decontamination station, respiratory protection area, incoming storage area, outgoing storage area, clean mask room, lavatories, and covered dock.

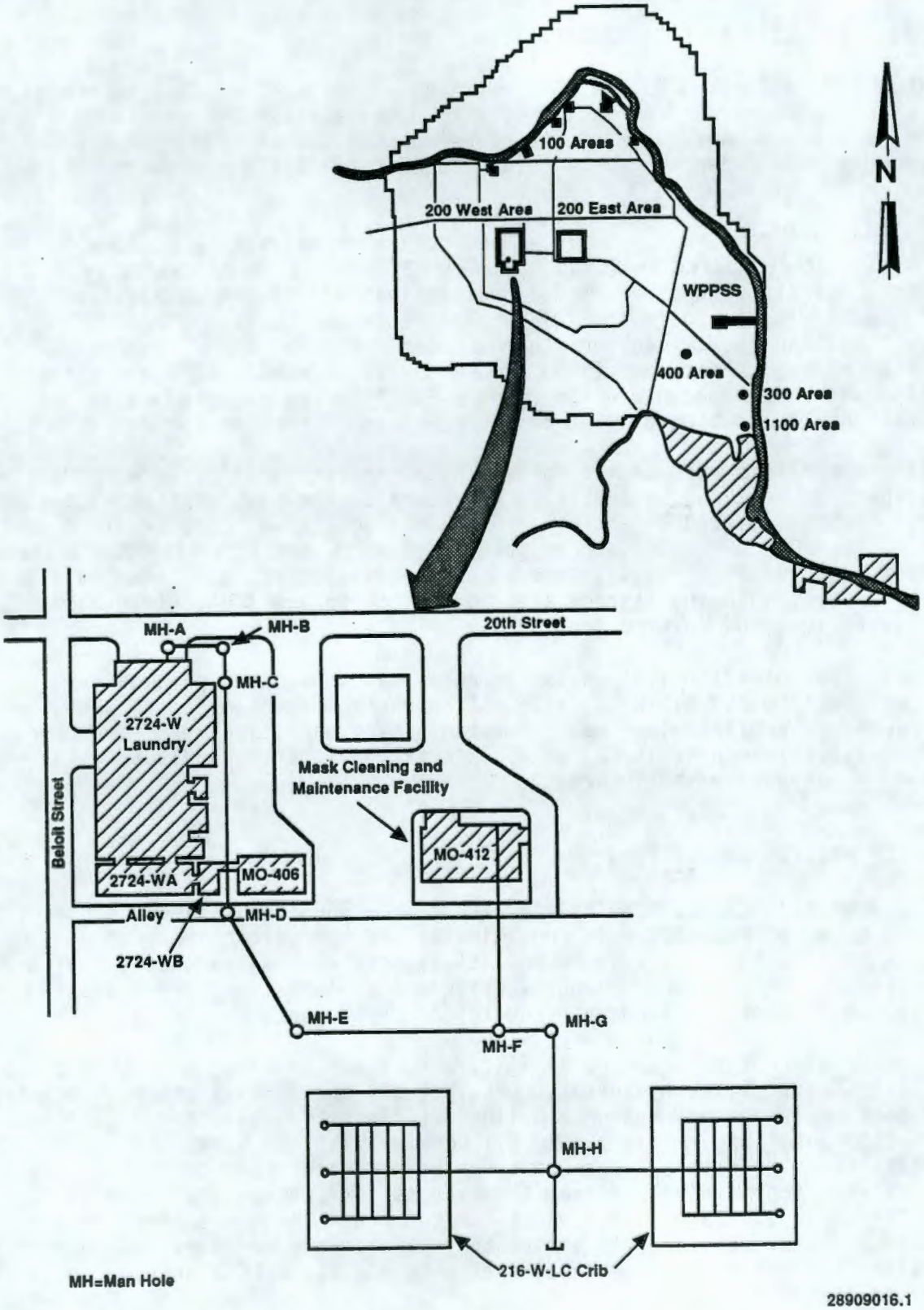
The decontamination station is the only area that has a physically connected drain to the 216-W-LC crib. Although the decontamination station was expected to replace older mask decontamination operations, it never became fully operational because it failed a six week trial period in 1986; it is not expected to operate in the future.

## 2.2 BRIEF PROCESS DESCRIPTION

The laundry facility handles approximately 1,350 t (3 Mlb) of laundry per year consisting of radioactively contaminated and nonradioactively contaminated clothing. Because commercial laundry washers and steam heated dryers are used in both the decontamination and sanitization processes, the facility uses commercial laundry products and maintenance chemicals.

The air discharges from the facility are either filtered through a cloth media lint filter or the hydrostatic precipitator and 296-W-1 stack. Because of the facility's age and design all liquid effluent is collected in a common 2,195 L (580-gal) sump. This liquid effluent consists of wash water; steam condensate from the dryers, room heaters, and hot water tank coils; and water from sink and floor drains and from the hydrostatic precipitator used to filter the dryer lint and room exhaust. After these liquids collect in the sump, the effluent is pumped to a vibratory lint screen for particulate filtration, beginning its gravity discharge to the 216-W-LC laundry crib, located southeast of the PEDF.

Figure 2-1. Aerial View.



Based on process data analysis, there is no effluent monitoring requirement according to DOE Order 5480.4 (DOE 1984). Currently, there is no sampling equipment available. Manual effluent samples are taken daily from the sump by Waste Tank/Tank Farms Program personnel for environmental protection as described in DOE Order 5400.5 (DOE 1990b). The samples are composited monthly and analyzed by Westinghouse Hanford laboratories with the data presented annually to U.S. Department of Energy Field Office, Richland by Westinghouse Hanford Environmental Protection (Brown 1990). Though the wastewater volumes are estimated by using the in-coming sanitary water meter and steam record charts, a new (ISCO, Incorporated, Model 2700) liquid sampler and flowmeter installation is expected this year.

This new sample equipment is part of Project B-697, Laundry Effluent Treatment, which will provide increased solids filtration to protect the laundry crib pipes from plugging. Although a liquid time or flow proportional sampler was installed in Manhole C northeast of the PEDF in 1981 for flow proportional sampling, it failed to provide accurate flow readings. It was set in the time proportional operation mode until the start of Project B-697 construction in 1989 at which time manual sampling began.



### 2.2.1 Radioactive Laundry Wash Process

Before the potentially contaminated radioactive laundry is received from the customer, radiation levels are verified to be within approved limits according to a site-wide RWP. Radioactivity limits are defined for both the overall bag and individual garment (to reduce risk, etc.).

In addition, the overall exterior of the bag is resurveyed before it is washed to establish the wash program. This reduces cross-contamination and allows additional washing of the heavier soiled garments, while providing for complete segregation through-out the facility. Because washer data sheets show that less than 10% of the in-coming laundry bags are contaminated above detectable levels the segregation allows operational flexibility in wash scheduling.

To reduce the potential of room airborne radiation, the soiled laundry bags are not opened or pre-sorted before washing. After their drawstrings loosened, the bags are placed inside the washer and submerged in water before the clothing is machine tumbled out of the bags. This is facilitated with a prewash, flush cycle to wet down the material.

Following the wash cycle, the wet items are placed on a turntable and sorted for drying. The material is then taken into the finishing rooms for folding, bagging, and final radiological surveys.

The dryers and room air exhausts to the hydrostatic precipitator where the effluent is filtered for particulate using a water bath, sampled, and discharged without high-efficiency particulate air (HEPA) filtration because of the low levels of radioactivity (Table 2-1). The exhaust sampler is a near isokinetic filter that provides a weekly composite.

Table 2-1. Facility Inventory at Risk.

| Radionuclide form | Physical/ chemical (Ci) | Quantity released | Projected dose |
|---|---|---|---|
| 1. Gross alpha | Air particulate | | <0.1 mrem/yr |
| 2. Gross beta | Air particulate | | <0.1 mrem/yr |
| 3. $^{90}SR$ | Aqueous | | >4 mrem/yr |
| Totals | Air particulate<br>Aqueous | | <0.1 mrem/yr<br>>4 mrem/yr |

| Regulated material | Stored quantity Kg (lb) | Annual quantity released | Reportable quantity Kg (lb) | Percent of Reportable quantity/yr |
|---|---|---|---|---|
| 1. Ammonium bicarbonate | 567 (1,250) | None | 2.3 t (5,000) | |
| 2. Sodium metasilicate | 485 (1,070) | None | 45 (100) | |
| 3. Sodium phosphate | 290 (640) | None | 101.2 t (225,000) | |
| 4. Dioctyl phthalate | 8 (17) | 42 | 101.2 t (225,000) | 0.84% |

### 2.2.2 Nonradioactive Laundry Wash Process

Nonradioactive laundry consists of typical industrial coveralls and lab coats. This process is similar to the above activity with the exception of a presort capability. The overall relative process volume is one third the total laundry process. Liquid discharges are collected in the facility sump and handled along with the radiological effluents. Air exhaust from this process is filtered using cloth media lint filters on each dryer.

### 2.2.3 Mask Station Process

The mask station operation handles only nonradioactive respiratory equipment. As stated above, the mask decontamination room with HEPA exhaust is not presently in use and is not expected to be operational in the future because of ineffective cleaning. The radioactively contaminated masks are decontaminated at Building 2706-T in the 200 West Area to background levels before they were received at the mask station.

After masks are sanitized and inspected, the mask canisters and face pieces are tested on a (Air Techniques, Incorporated, Model Q-127) smoke generator before field reuse. The mask washer uses dish soap and sanitizer that are not regulated. The liquid effluent is discharged to the sanitary sewer. The Q-127 heats dioctyl phthalate (DOP) to generate smoke that is filtered through a portable HEPA filter vacuum and discharged back into the room.

## 2.3 IDENTIFICATION AND CHARACTERIZATION OF POTENTIAL SOURCE TERMS

The radioactive laundry process has a potential to discharge radioactive airborne and liquid effluents during wash and dry operations. The quantities of each discharge source appear in Table 2-1 and are from the annual effluent discharge report (Brown 1990).

The mask station and nonradioactive laundry processes have no potential to generate radioactive airborne and liquid effluents; however, all hazardous material inventories are presented in Table 2-1. This information is documented in the *Superfund Amendments and Reauthorization Act of 1986* (SARA) database used at the Hanford Site.

Potential sources of hazardous material inventories are the laundry soap products and maintenance chemicals used within the facility. Chemical soiled clothing is not considered a potential source using criteria of WAC 173-303 (Ecology 1989a). That is, laundering is not considered waste treatment. The specific locations of the materials in the facility are discussed in Section 4.0 of this document.

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# 3.0 APPLICABLE REGULATIONS

Regulations pertaining to effluent releases at the Hanford Site have been developed by several regulatory agencies: the Environmental Protection Agency (EPA), DOE, Washington Department of Ecology (Ecology), and the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority (APCA 1980). Westinghouse Hanford has established administrative requirements for compliance based on as low as reasonably achievable (ALARA); however, this plan has been prepared against the federal, state, and local regulations, and DOE orders to maintain consistency. Table 3-1 gives a brief summary of the regulations and standards applicable to this FEMP. Westinghouse Hanford is currently reviewing this FEMP for compliance to applicable regulations and comments will be incorporated into future revisions. This review will be completed by January 1, 1991.

## 3.1 FACILITY EFFLUENT MONITORING PLAN REQUIREMENTS

Requirements for FEMPs are provided in DOE Order 5400.1, "General Environmental Protection Program" (DOE 1988). The order provides specific information in Chapter IV on the requirements for effluent monitoring. A written environmental monitoring plan shall be prepared for each site, facility, or process that uses, generates, releases, or manages significant pollutants or hazardous materials.

To ensure the health and safety of the public, radioactive effluents and nonradioactive pollutants released at the Hanford Site shall be monitored in accordance with the DOE 5400 Series of Orders (DOE 1988); Title 40, Code of Federal Regulations (CFR), Part 61 and 302-306 (EPA 1989a); and WAC 173-303 (Ecology 1989a). Information on the monitoring requirements for liquid effluent release pathways is presented according to whether the effluent is radioactive or nonradioactive hazardous material. Regulations pertaining to the monitoring and environmental surveillance requirements of effluents are typically based on the effluent release limits for that material associated with the risk to the public.

Monitoring programs should be conducted in a manner that provides accurate measurements of the quantity and/or concentration of liquid pollutants in effluents as a basis for (1) determining compliance with applicable discharge and effluent control limits, effluent standards or guides, and with environmental standards; (2) evaluating the adequacy and effectiveness of containment, waste treatment, control, efforts toward achieving levels of radioactivity that are ALARA considering technical and economical constraints; and, (3) compiling an annual inventory of the radioactive material released in effluents and onsite discharges.

Effluents are sampled after particulate filtration and the last point of control before entering the disposal system. This is required to determine the effluent concentrations at the point of discharge from the facility according to environmental regulations (DOE 1990b). The PEDF has been in operation since the early 1950's and does not have a discharge or operating

| Agency/Originator | Regulation No. | HA | HL | RA | RL | Summary/Application |
|---|---|---|---|---|---|---|
| U.S. Department of Energy, (DOE) Washington, D.C. | DOE Order 5400.1, 1988 General Environmental Protection Program | X | X | X | X | Outlines effluent monitoring requirements |
| | DOE Order 5400.5, 1990 Radiation Protection of the Public and Environment | | | X | X | Protects public/environment from radiation associated with DOE operations |
| | DOE Order 5480.4, 1989 Environmental Protection, Safety, and Health Protection (ES&H) Standards | X | X | X | X | Sets requirements for the application of the mandatory ES&H standards; lists reference ES&H standards |
| | DOE Order 5484.1, 1981 Environmental Protection, Safety, and Health Protection Information Reporting Requirements | X | X | X | X | Sets requirements for reporting information having ES&H protection significance |
| | DOE Order 5820.2A, 1988 Radioactive Waste Management | X | X | X | X | Sets radioactive waste management requirements |
| U.S. Environmental Protection Agency, (EPA) Washington, D.C. | 40 CFR 61, 1989 National Emission Standards for Hazardous Air Pollutants (NESHAP) | X | | X | | NESHAPs |
| | 40 CFR 61, 1989 Subpart A General Provisions | X | | | | Regulates hazardous pollutants |
| | 40 CFR 61, 1989 Subpart H National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities | | | X | | Sets emissions standards/monitoring requirements for radionuclides |
| | 40 CFR 122, 1983 The EPA Administered Permit Programs: The National Pollutant Discharge Elimination System | | X | | | Governs release of nonradioactive liquids |
| | 40 CFR 141.16, 1989 Safe Drinking Water Act (National Interim Primary Drinking Water Regulations) | | X | | X | Sets maximum contaminant levels in public water systems |
| | 40 CFR 191, 1985 Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes | | | | X | Regulates radioactive waste disposal |
| | 40 CFR 261, 1989 Identification and Listing of Hazardous Waste | | X | | | Identifies and lists hazardous wastes |
| | 40 CFR 302.4, 1980 Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA): Designation, Reportable Quantities and Notification | X | X | X | X | Designates hazardous materials, reportable quantities, notification process |

Table 3-1. Applicable Regulations and Standards.

| Agency/Originator | Regulation No. | HA | HL | RA | RL | Summary/Application |
|---|---|---|---|---|---|---|
| EPA (Cont'd) | 40 CFR 355, 1987<br>Superfund Amendments and Reauthorization Act of 1986 (SARA): Emergency Planning and Notification | X | X | | | Identifies threshold planning quantities for extremely hazardous substances |
| | 40 CFR 403-471, 1990<br>Effluent Guidelines and Standards | | X | | | Sets pretreatment standards for wastewater discharged to Public-Owned Treatment Works (POTW) |
| American National Standards Institute, New York, New York | N 13.1 - 1969*<br>Guidance to Sampling Airborne Radioactive Materials in Nuclear Facilities | | | X | | Sets standards for effluent monitoring systems |
| | N 42.18*, 1974<br>Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents | | | X | X | Recommendations for the selection of instrumentation for the monitoring of radioactive effluents |
| Washington State Department of Ecology, (Ecology) Olympia, Washington | WAC 173-216, 1989<br>State Waste Discharge Permit Program | | X | | | Governs discharges to ground and surface waters |
| | WAC 173-220, 1988<br>National Pollutant Discharge Elimination System (NPDES) Permit | | X | | X | Governs wastewater discharges to navigable waterways; controls NPDES permit process |
| | WAC 173-240, 1990<br>Submission of Plans and Reports for Construction of Wastewater Facilities | | X | | | Controls release of nonradioactive liquids |
| | WAC 173-303, 1989<br>Dangerous Waste Regulations | | X | | | Regulates dangerous wastes; prohibits direct release to soil columns |
| | WAC 173-400, 1976<br>General Regulations for Air Pollution Sources | X | | | | Sets emissions standards for hazardous air pollutants |
| Benton-Franklin Walla-Walla Counties Air Pollution Control Authority, Richland, Washington | General Regulation 80-7, 1980 | X | | | | Regulates air quality |

HA = hazardous airborne.
HL = hazardous liquid.
RA = radioactive airborne.
RL = radioactive liquid.
*Refers to standards that are referenced in the DOE and EPA regulations.

permit. As an existing facility, subsequent surveys and continued monitoring are required based on the operation and inventory at risk.

## 3.2 HAZARDOUS MATERIAL

The EPA regulations pertaining to the release of hazardous substances from DOE facilities are presented in 40 CFR 302, "Designation, Reportable Quantities, and Notification" (EPA 1989b). This regulation, in accordance with Sections 101 (14) and 102 (a) of the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA), defines hazardous substances, identifies reportable quantities of those substances, and set forth notification requirements for releases of those substances. This regulation also describes reportable quantities for hazardous substances designated under Section 311 (b) (2) (A) of the *Clean Water Act of 1977*. Any credible or potential upset condition identified in the FEMP determination shall be evaluated as to its risk to the environment using the CERCLA values (reportable quantities) as a basis for determining monitoring and/or sampling. Actions necessary to be in compliance with the above requirements shall be stated in this FEMP.

## 3.3 AIRBORNE EFFLUENTS

Airborne emissions of radioactive materials from DOE-controlled facilities at the Hanford Site are subject to 40 CFR Part 61, *National Emissions Standards for Hazardous Air Pollutants* (NESHAP) (EPA 1989a) as stated in DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1990a), and DOE 5400.1, Chapter IV, "Environmental Monitoring Requirements" (DOE 1988). The list of hazardous air pollutants regulated under the NESHAPs is provided in Subpart A, "General Provisions." The specific emissions standards and monitoring requirements for radionuclides are contained in Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities." Subpart H covers all DOE operations that emit radionuclides other than radon to the air.

Subpart H presents detailed requirements for emissions monitoring and test procedures (61.93), compliance and reporting (61.94), record-keeping requirements (61.95), and exemptions from the reporting and testing requirements of 40 CFR Part 61 (61.97). Radionuclide emission rates from stacks and vents must be measured at all release points that have the potential to discharge radionuclides into the air in quantities that could cause an effective dose equivalent in excess of 1% from the NESHAPS 10 mrem/yr standard.

The projected dose equivalent for offsite determined by Westinghouse Hanford Environmental Protection from the laundry is less than 0.1 mrem/yr. Because the PEDF does not have HEPA filtration, the potential to discharge radionuclides is based on the discharge from the effluent stream without any pollution control equipment as normal operation. Furthermore, all radionuclides which could contribute greater than 10% of the potential effective dose equivalent for each release point must be measured. For release points that have a potential to release radionuclides into the air, but have

effluents below the continuous monitoring standard, periodic confirmatory measurements must be made to verify low emissions. With EPA approval alternative methods to the one described, including process knowledge, can be substituted for measurement to determine the emission levels of individual radionuclides.

The Derived Concentration Guides (DCG) of DOE Order 5400.5 ensure that offsite exposure is less than 100 mrem (DOE 1990b). The DCGs also ensure that the airborne emissions are below the required levels for compliance with all applicable radionuclide emission limits for federal, state, and local authorities.

In Washington State, airborne effluents are regulated by the *Washington Clean Air Act of 1967*. General regulations for air pollution sources are presented in WAC 173-400 (Ecology 1976) and includes emission standards for sources emitting hazardous air pollutants in WAC 173-400-075. The Westinghouse Hanford has received verbal concurrence from Ecology that laundry nonradioactive clothes dryers should not be included under WAC 173-400.



## 3.4 LIQUID EFFLUENTS

Chapter II of DOE Order 5400.5 presents the required limits for exposure of the public to radioactive materials from DOE-controlled facilities through drinking water (DOE 1990b). The DOE requires that any person consuming drinking water can not receive an effective dose equivalent greater than 4 mrem in a year, excluding naturally occurring radionuclides. It is DOE policy to comply with the radiological criteria of the public community drinking water standards of 40 CFR 141, "National Interim Primary Drinking Water Regulations" (*Safe Drinking Water Act*); the maximum contaminant levels in public water systems are found in Sections 15 and 16 (EPA 1989c).

Liquid effluents from DOE-controlled facilities that have the potential for radioactive contamination must be monitored in accordance with the requirements of DOE Orders 5400.1 and 5400.5 (DOE 1988, 1990b). Facility operators must provide monitoring of liquid waste streams adequate to (1) demonstrate compliance with the applicable requirements of DOE 5400.5, Chapter II, (2) quantify radionuclides released from each discharge point, and (3) alert affected process supervisors of upsets in processes and emissions controls.

Washington State controls discharges to ground and surface waters within the state according to WAC 173-216 (Ecology 1989b). In addition to EPA requirements, the state and local sewerage agencies may impose additional limitations, monitoring, and reporting requirements. Because the Hanford Site has 33 separate discharges, the *Hanford Federal Facility Agreement and Consent Order*, also known as the Tri-Party Agreement, has established milestones for compliance plans of liquid discharges to land that could infiltrate to groundwater (Ecology, et al. 1991).

Because the current laundry facility will end operation and stop all discharges by the 1995 Tri-Party Agreement milestone, it will not require a discharge permit. Project B-503, Decontamination Laundry Facility (DLF), will provide future laundry operation. The DLF will require a discharge permit.

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# 4.0 IDENTIFICATION AND CHARACTERIZATION OF EFFLUENT STREAMS

Laundry wastewater is the combination of effluents from many concurrent activities. During laundry operation, the machines are at different points in their respective cycles. Consequently, point source sampling at the various machines, while providing information about discharges from a particular machine, does not adequately characterize the composition of routine laundry wastewater.

## 4.1 IDENTIFICATION AND CHARACTERIZATION OF SOURCE TERMS CONTRIBUTING TO EACH EFFLUENT STREAM

Although the laundry facility is the only routine wastewater source to the 216-W-LC crib, there are 34 out of a crib total of 78 frequent contributors or points of entry into the crib from the laundry. The remaining contributors are infrequent sources and include crib vent risers, manholes, floor drains, and the out-of-service mask station decontamination sink.

As shown in Figure 4-1, routine wastewater sources include: five washing machines; five dryer steam condensate lines; one heating, ventilation, and air conditioning system; the hydrostatic precipitator lint filter; boiler tank heating coils; and one handwashing sink.

To obtain a representative sample for the entire laundry wastewater, the discharge point for the validated sample data in stream-specific report (WHC 1990) was selected as Manhole H to obtain discharge concentrations at the end of pipe. Radiological data has been obtained from both Manhole C and the sump to document radionuclide inventory discharge information.

The specific locations of the materials in the facility are as follows.

- The radionuclides are generally spread throughout the laundry garments with the majority of contamination in the soiled laundry storage room adjacent to the washers and dryers.

- The laundry detergents and bleach are purchased as a powder with the exception of the liquid degreaser, which does not have any reportable quantities of hazardous chemicals listed in Title 40 CFR 302 (EPA 1989b). These products are interim stored in bins outside of the facility upon their arrival from the company warehouse. When a product is needed, individual containers are moved into the process area allowing manual feeding of the products into the washers.

- The DOP is used for smoke testing the respiratory equipment. It is stored in a two gallon container, 7.7 kg (17 lb) maximum, within a controlled flammable storage cabinet in Mobile Office MO-412. Typically, small amounts of DOP have to be added to the Q-127 throughout the year to replenish the system.

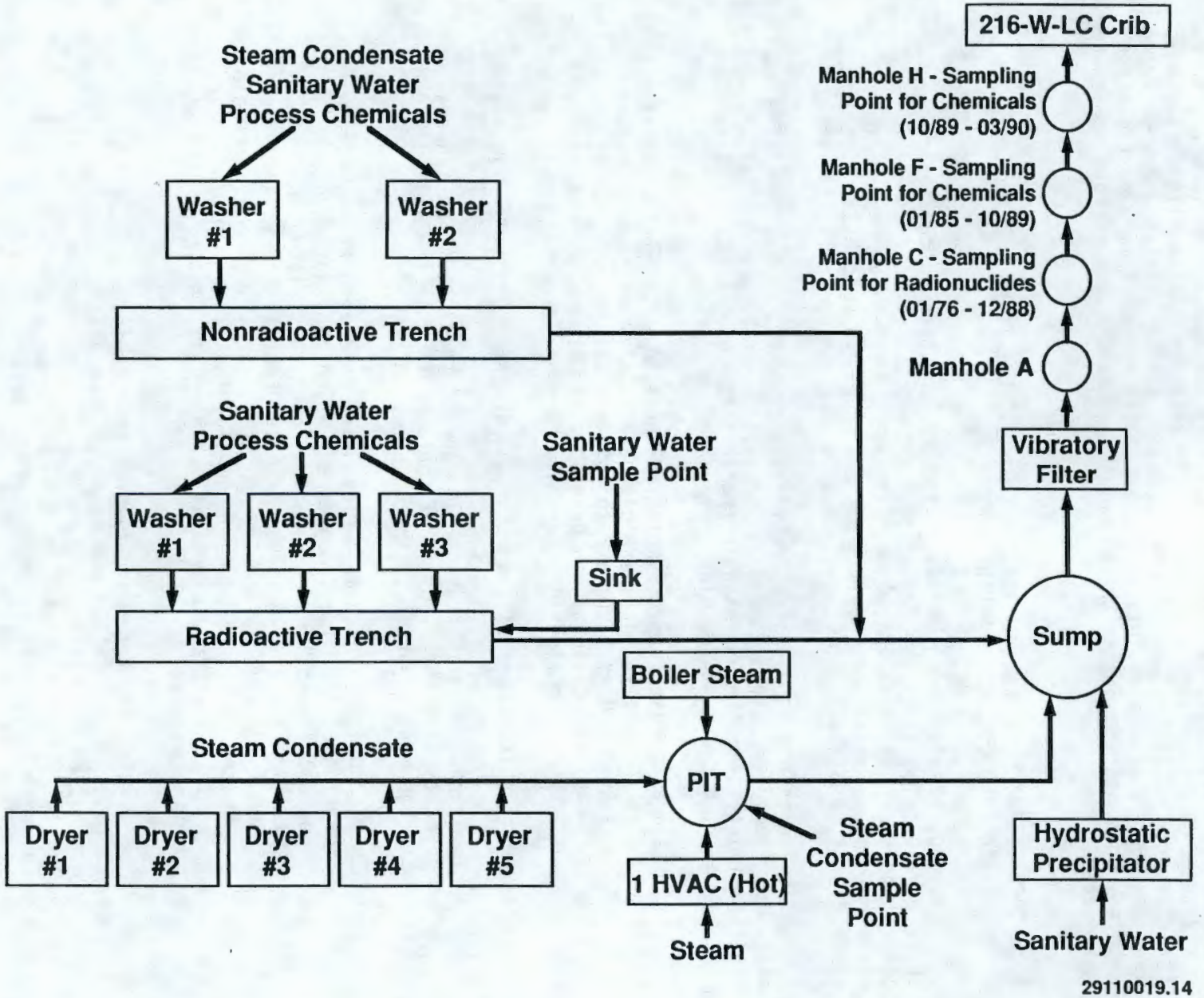


Figure 4-1. Wastewater Flow Schematic.

### 4.1.1 Routine Operating Conditions

Radiological material is relatively higher in the material receiving and storage areas than other areas. However, detail accounting is not possible because of a lack of available technology to monitor the constant laundry throughput. Based on the level of contamination and the limited amount of clothing per load, constituents are diluted with 2,280 L (600 gal) of water per washer which is further diluted in the drain system.

The hazardous material inventories are distributed throughout the process areas with locations addressed in Section 4.1 of this document.

### 4.1.2 Upset Operating Conditions

The laundry facility is considered a low hazard, nuclear facility because it has a radioactive inventory. However, the inventory levels are orders of magnitude below a moderate hazard criteria; all radioactive material within the facility could be released without exceeding the onsite or offsite dose limits to the population. Therefore, no upset operating conditions have been determined.

Based on the quantities of powdered soap needed to exceed the reportable limits a process upset or spill is not capable of discharging significant amounts of hazardous materials. It would require several hundred pounds of soap to be flushed down the floor drains rather than swept up for reuse. Accordingly, no upset operating condition is credible.

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## 5.0 EFFLUENT POINT OF DISCHARGE DESCRIPTION

Although there are 34 routine wastestream sources within the facility, the laundry recognizes only one discharge point (i.e., sump) because of converging streams. The sewer line is an 20.3-cm (8-in.) vitrified clay pipe which connects the sump to the 216-W-LC laundry crib.

During operation, the estimated average flow rate is 380 L (100 gal)/min based on water meter readings having a maximum flow of 570 L (150 gal)/min based on pump capacity. Process shutdowns occur as a result of maintenance outages on equipment. During the downtimes, the flow rate is significantly reduced to only steam condensate.

The facility storm drains collect the runoff in separate caissons around the exterior of the building. Process water cannot enter these drains. Because the soap products are stored outside in metal bins, spill kits have been provided at each storage location (DOE 1988).

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# 6.0 EFFLUENT MONITORING/SAMPLING SYSTEM DESIGN CRITERIA

## 6.1 OLD FACILITIES

The PEDF does not have any monitoring or alarm equipment because the effluent concentration levels are orders of magnitude below detection limits of in-line monitors. For environmental protection in accordance with DOE Order 5400.5 (DOE 1990b) the effluent constituents are documented for release from samples that have been composited monthly.

This facility has been in operation since 1952 and can not be economically upgraded to meet current environmental regulations. To adequately address all environmental regulations, Project B-503, "Decontamination Laundry Facility" has been approved by the DOE and is scheduled to provide laundry services starting in 1995. The new facility will utilize the Best Available Technology approach for wastewater treatment and discharge. Until then, the PEDF will provide laundry services with continued discharges to the environment using the laundry crib.

In Section 8.0 of this document, effluent discharge information is compared to established criteria to meet DOE Order 5400.1 (DOE 1988) for effluent monitoring plan compliance.

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## 7.0 CHARACTERIZATION OF CURRENT EFFLUENT MONITORING SYSTEM

The current effluent monitoring system or program is performed as a service to the laundry facility by the Waste Tank Program. Until new sample equipment in Project B-697 is available, and to comply with environmental regulations (DOE 1990b), the monitoring program consists of manual grab samples taken by Tank Farm personnel on a daily basis according to Tank Farm surveillance operating procedure. Each week, the B Plant sample truck is contacted to pick-up and transfer the composites to the Westinghouse Hanford 222-S Analytical Laboratory for monthly analysis.

Routine sample information is compiled in annual radiological discharge the reports generated by Environmental Protection as required by the RL. The laundry effluent is analyzed routinely for total Alpha, total Beta, $^{90}Sr$, $^{129}I$, $^{137}Cs$, $^{241}Am$, and $^{239/240}Pu$. The most limiting isotope for total Alpha is $^{239}Pu$ and the most limiting isotope for total Beta is $^{90}Sr$.

New sample information was generated and analyzed in the wastewater stream-specific report (WHC 1990) to complete a dangerous waste designation on the laundry waste stream. Four random samples were taken during a 6-mo period and are included for a more complete list of potential radionuclide constituents.

Using Table 7-1, a comparison of the sample information with the DCG was performed. The DCGs of DOE Order 5400.5 ensure that the offsite exposure is less than 4 mrem (DOE 1990b). As shown, the gross activity and three of the seventeen radionuclides are above the DCG's.

Although the term gross activity indicates approximate activities, they have been compared to more accurate individual activities to reduce the potential of overlooking a significant individual emitter. This review identified that the gross activity is greater than the sum of activity for known emitters.

To verify and resolve this difference, the general routine monthly report needs to include less significant radionuclide constituents for this specific stream. The 222-S Laboratory reports significant emitters, to be at least 90% of the total gross activity. Otherwise, they are not reported because of insignificant levels. However, this stream has numerous minor emitters that influence the gross activity when combined.

Routine analysis will include the radionuclides identified in the wastewater stream-specific report (WHC 1990a) that are above 4% of the DCG limits shown in Table 8-1. These specific isotopes are $^{60}Co$, $^{210}Pb$, $^{228}Ra$, $^{238}Pu$, $^{244}Cm$, $^{234}U$, $^{235}U$ and $^{238}U$. Also, total Uranium and $^{99}Tc$ activity for Beta emitters were identified through discussions with the PEDF customers with potential contamination on their clothing. This modification to the 222-S Laboratory report will determine the validity of this difference and resolve this issue.

Table 7-1. Liquid Effluent Data Summary.

| Radionuclide (uCi/mL) | 1990 (90% CILim) | Annual Average* | Derived Concentration Guide |
|---|---|---|---|
| Gross Alpha | 4.51 E-07 | <4.80 E-08 | 3.00 E-08 |
| Gross Beta | 3.42 E-06 | <3.45 E-06 | 1.00 E-06 |
| $^{90}Sr$ | 3.22 E-06 | 3.84 E-08 | 1.00 E-06 |
| $^{239,240}Pu$ | 3.95 E-07 | <1.56 E-08 | 3.00 E-08 |
| $^{241}Am$ | 1.16 E-07 | <1.50 E-08 | 3.00 E-08 |
| $^{137}Cs$ | 3.57 E-07 | <6.79 E-08 | 3.00 E-06 |
| $^{129}I$ | N/A | <5.56 E-08 | 5.00 E-07 |
| $^{244}Cm$ | 2.10 E-09 | N/A | 6.00 E-08 |
| $^{60}Co$ | 5.45 E-07 | N/A | 5.00 E-06 |
| $^{3}H$ | 3.64 E-06 | N/A | 2.00 E-03 |
| $^{54}Mn$ | 7.45 E-08 | N/A | 5.00 E-05 |
| $^{22}Na$** | 8.88 E-08 | N/A | 1.00 E-05 |
| $^{210}Pb$ | 2.03 E-09 | N/A | 3.00 E-08 |
| $^{238}Pu$ | 3.39 E-08 | N/A | 4.00 E-08 |
| $^{228}Ra$** | 2.50 E-07 | N/A | 1.00 E-07 |
| $^{106}Ru$ | 5.98 E-08 | N/A | 6.00 E-06 |
| $^{234}U$ | 1.42 E-07 | N/A | 5.00 E-07 |
| $^{235}U$ | 1.53 E-08 | N/A | 6.00 E-07 |
| $^{238}U$ | 1.63 E-07 | N/A | 6.00 E-07 |

*Brown (1990)

**Indicates only one sample result.

<Indicates that monthly less than results contributed at least 10% of the annual total.

# 8.0 HISTORICAL MONITORING/SAMPLING DATA FOR EFFLUENT STREAMS

The routine daily grab samples are for an interim period during Project B-697 construction and less than desirable as verified by random samples of the wastewater stream-specific report (WHC 1990) showing consistently higher values. As a resolution, the new sampler will provide a accurate representation of the radionuclide concentrations through more frequent sampling.

Specifically, the wastewater samples should be taken at a rate of 100 mL (3 oz) per sample at a flow rate of one sample per 3,785 L (1,000 gal). A sample of 400 mL (12 oz) per day is to be combined to accumulate a weekly 2.0 L (60 oz) sample, which is required for 222-S Laboratory minimum sample volumes.

## 8.1 NORMAL CONDITIONS

The daily volume of laundry processed from nearly 100 individual customers is 7.2 t (8 tons) of clothing which generates approximately 152,000 L (40,000 gal) of effluent. Because the laundry facility does not generate radionuclide material, laundry operations include verification of the contamination levels on the clothing received before being processed. This is accomplished by checking the radiation tags on each laundry bag against the laundry facility radiation surveys.

A review of the historic effluent information (Brown 1990) demonstrates that the radionuclide concentrations are consistently less than values. This supports the statement that operational controls maintain routine operations within DCG limits as evident from the sample data.

## 8.2 UPSET CONDITIONS

In April 1990, processed laundry was being surveyed for radiological release to the field when abnormally high radioactivity was discovered on a article of clothing. Follow-up laboratory analysis of the article determined the radionuclide isotopes were specific to one customer facility. Because the average monthly concentrations are consistently less than detectable values, this one-time event did not exceed the release guidelines. However, it were considered a significant change from normal conditions.

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# 9.0 SAMPLE ANALYSIS

## 9.1 ANALYTICAL LABORATORY AND PROCEDURES

The 222-S Laboratory performs all analytical laboratory work following Westinghouse Hanford approved procedures. This provides proper handling of the samples, current equipment calibration, accurate analytical work methods, and certified data reporting for ensurance of accurate sample analysis results.

## 9.2 U.S. DEPARTMENT OF ENERGY ANALYTICAL AND LABORATORY GUIDELINES

Because the laundry facility obtains environmental sampling support, the samples are taken and controlled by other organizations. Sampling is performed by Waste Tank Program personnel with transport to the 222-S Laboratory using of Defense Waste Remediation procedures.

The analytical and laboratory procedures for the FEMP activities are identified in the *Quality Assurance Project Plan for the Facility Effluent Monitoring Plan Activities* (WHC 1991b). General requirements for laboratory procedures, data analyses, and statistical treatment are addressed in the QAPP. Detailed descriptions of these requirements are given in each FEMP.

The following elements are identified in *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991).

Table 9-1. Laboratory Procedures.

| Element | Documentation |
|---|---|
| Sample identification system | To be provided when complete |
| Procedures preventing crosscontamination | Contained in 222-S Laboratory Analytical Procedures (identified in QAPP WHC-EP-0446 Table 8-1) |
| Documentation of methods | Contained in 222-S Laboratory Analytical Procedures (identified in QAPP WHC-EP-0446 Table 8-1) |
| Gamma emitting radionuclides | See QAPP Table 8-1 |
| Calibration | See QAPP Table B-1 |
| Handling of samples | See QAPP Table 8-1 |
| Analysis method and capabilities | See QAPP Table 8-1 |
| Gross alpha, beta, and gamma measurements | See QAPP Table 8-1 |
| Direct gamma-ray spectrometry | See QAPP Table 8-1 |

Table 9-1. Laboratory Procedures.

| Element | Documentation |
|---|---|
| Beta counters | See QAPP Table 8-1 |
| Alpha-energy analysis | See QAPP Table 8-1 |
| Radiochemical separation procedures | To be provided when available |
| Reporting of results | To be provided when available |
| Counter calibration | See Table B-1, QAPP |
| Intercalibration of equipment and procedures | To be provided when available |
| Counter background | Contained in 222-S Laboratory Analytical Procedures (QAPP, Table 8-1) |
| Quality assurance | To be provided when available |

Table 9-2. Data Analyses and Statistical Treatment.

| Element | Documentation |
|---|---|
| Summary of data and statistical treatment requirements | To be provided when available |
| Variability of effluent and environmental data | To be provided when available |
| Summarization of data and testing for outliers | To be provided when available |
| Treatment of significant figures | To be provided when available |
| Parent-decay product relationships | To be provided when available |
| Comparisons to regulatory or administrative control standards and control data | To be provided when available |
| Quality assurance | To be provided when available |

# 10.0 NOTIFICATIONS AND REPORTING REQUIREMENTS

Notifications and reporting of specific events related to environmental releases and/or events involving effluents and/or hazardous materials shall made in accordance with DOE Orders 5400.1 (DOE 1988) and 5000.3A (DOE 1990a). Implementation of the orders is accomplished using *Management Requirements and Procedures*, WHC-CM-1-3, MRP 5.14 (WHC 1990b).

## 10.1 DEFINITIONS

**Primary Environmental Monitors**--Monitoring equipment legally required to monitor ongoing discharges. In general, this term applies to monitors closest to the point of discharge that are used to determine if discharges are within specified limits.

**Secondary Environmental Monitors**--Environmental monitoring equipment or activities which, if degraded, will produce more than minor disruption of a monitoring program. An example of a minor disruption would be the failure of a unit whose place in the program is effectively overlapped by one or more components.

**Environmental Control Limit (ECL)**--Environmental requirements based on permit limits, DOE, EPA, or Ecology requirements, and Westinghouse Hanford policy.

**Hazardous Substance or Material**--Solid, liquid, or gaseous material as defined by the following regulations.

- Any CERCLA hazardous substance identified in 40 CFR 302.4 (EPA 1989b).
- Any SARA extremely hazardous substance identified in Appendix A of 40 CFR 355 (EPA 1988).
- Any dangerous waste regulated pursuant to the WAC 173-303, "Dangerous Waste Regulations" (Ecology 1989a).

**Nonconformance**--A nonconformance exists when the following has occurred, and appropriate recovery actions are implemented.

- Exceeding an ECL.
- Failure to meet an environmental surveillance requirement.
- Failure to implement an environmental administrative control.
- Failure of primary environmental monitoring equipment to pass a surveillance check.

**Oil**--Any kind or form of oil, including, but not limited to, petroleum, fuel oil, sludge, oil refuse and oil mixed with wastes other than dredged spoil.

**Occurrence Report**--A written evaluation of an event or condition that is prepared in sufficient detail to enable the reader to assess its significance,consequences, or implications and evaluate the actions being proposed or employed to correct the condition or avoid recurrence.

**Releases**--Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of substances into the environment. This includes abandoning or discarding any type of receptacle containing substances or the stockpiling of a reportable quantity of a hazardous substance in an unenclosed containment structure.

**Statistically Significant Increase**--The largest 5% of all continuous releases when used in reference to a continuous release of a hazardous substance listed in 40 CFR 302.4 (EPA 1989b). Determination of statistical significance shall be based on any of the following:

a. Non-parametric statistical test
b. Control chart or student t test
c. Other tests that have equivalent sensitivity to (a) or (b).

## 10.2 REQUIREMENTS

### 10.2.1 Occurrence Identification and Immediate Response

1. Each employee shall identify events and conditions, and promptly notify management of such occurrences.

   - Call 811 if immediate help (e.g., fire, ambulance, or patrol) is required.
   - Call 3-3800 (the Patrol Operations Center) if assistance other than fire, ambulance, or patrol is required.
   - After requesting necessary outside assistance, the employee shall notify their supervisor, who shall notify the facility manager, the building emergency director, and the Occurrence Notification Center (6-2900).

2. Operations personnel shall take appropriate immediate action to stabilize or return the facility/operation to a safe condition.

3. The oversight organizations shall notify their U.S. Department of Energy, Field Office, Richland counterparts of the event after receiving notifications from and discussing the event with the facility manager.

### 10.2.2 Occurrence Categorization

Occurrences (environmental) shall be categorized as soon as practical using specific criteria for radioactive and hazardous materials release. These categorizations should be made within 2 h of identification. Occurrences shall be categorized by their seriousness; if categorization is not clear, the occurrence shall be initially categorized at the highest level being considered. The occurrence categorization shall then be evaluated, maintained, or lowered as information becomes available.

## 10.3 OCCURRENCE CATEGORIZATION

### 10.3.1 Radioactive Releases

Radioactive releases are divided into the following categories.

1. EMERGENCY

   - Release of radioactive material to controlled or uncontrolled areas in concentrations that, if averaged over a 24-h period would exceed 5,000 times the DCG.
   - Release of radioactive material offsite that is not a normal monitored release and could result in an annual dose or dose commitment to any member of the general population greater than 500 mrem.

2. UNUSUAL OCCURRENCE

   - Release of radionuclide material that violates environmental requirements in permits, regulations, or DOE standards as determined by Westinghouse Hanford Environmental Protection.
   - Release below emergency levels that require immediate reporting to regulatory agencies or trigger outside agency specific action levels as determined by Westinghouse Hanford Environmental Protection.

3. OFF-NORMAL

   - Release of radionuclides not normally monitored.
   - Discovery of radionuclides where they are not expected (e.g., storm and sanitary sewers) and for which no immediate explanation is available.
   - Statistically significant increase in normally monitored releases of radionuclides to an uncontrolled area.

- Release of radionuclides that will be reported to an outside agency (excluding normal reporting) but not classified as an unusual occurrence.

- Controlled and monitored (instantaneous) gaseous radionuclide release exceeding 5,000 times the DCG over any 4-h period.

- Controlled and monitored (instantaneous) liquid radionuclide release exceeding 5,000 times DCG.

### 10.3.2 Hazardous Substances Releases

Hazardous substances releases are divided into the following categories.

1. EMERGENCY

   Actual or potential release of material to the environment that results in or could result in significant offsite consequences (i.e., the need to relocate people and secure downstream water supply intakes, major wildlife kills, woodland degradation, and aquifer contamination).

2. UNUSUAL OCCURRENCE

   Release of a hazardous substance, regulated pollutant, or oil that exceeds a reportable quantity, federal permits, DOE standards, or levels requiring immediate reporting to outside agencies as determined by Westinghouse Hanford Environmental Protection.

3. OFF-NORMAL

   - Unmonitored release of hazardous substance or regulated pollutant as determined by Westinghouse Hanford Environmental Protection.

   - Statistically significant increase of hazardous substance in normally monitored released.

   - Discovery of a toxic or hazardous substance where it is not expected.

   - Release of a hazardous substance or oil which is not classified as unusual occurrence but will be reported to outside agencies (excluding normal reporting) as determined by Westinghouse Hanford Environmental Protection.

### 10.3.3 Agreement/Compliance Activities

Agreement/Compliance Activities are divided into the following categories.

1. UNUSUAL OCCURRENCE

   - Agreement, compliance, remediation, or permit-mandated activity for which notification has been received from the relevant regulatory agency that a site plan is not satisfactory, or that a site is considered to be in noncompliance with schedules or requirements.

   - Occurrence under any agreement or compliance area that requires notification of an outside agency within 4 h or less, triggers an outside regulatory agency action level, or indicates specific interest/concern from such agencies.

2. OFF-NORMAL

   - Occurrence under any agreement or compliance area that will be reported to outside agencies in a format other than routine monthly or quarterly reports.

   - Changes to existing agreements or permit-mandated activities.

   - Development of news agreements or permit-mandated activities.

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# 11.0 INTERFACE WITH THE OPERATIONAL ENVIRONMENTAL SURVEILLANCE PROGRAM

## 11.1 DESCRIPTION

The sitewide Environmental Monitoring Plan (EMP), as described in the FEMP Management Plan (WHC 1991a), consists of two distinct but related components: environmental surveillance conducted by Pacific Northwest Laboratory (PNL) and effluent monitoring conducted by Westinghouse Hanford. The responsibilities for these two portions of the EMP are delineated in a Memorandum of Understanding (PNL/WHC 1989). Environmental surveillance, conducted by PNL, consists of surveillance of all environmental parameters to demonstrate compliance with regulations. Effluent monitoring includes both in-line and facility effluent monitoring as well as near-field (near-facility) operational environmental monitoring. Projected effective dose equivalent (EDE), reported in this FEMP, are the products of in-line effluent monitoring. Near-field monitoring is required by Part O, "Environmental Monitoring," *Environmental Compliance Manual* (WHC 1991c), and procedures are described in *Operational Environmental Monitoring* (WHC 1988).

## 11.2 PURPOSE

Near-field (operational environmental) monitoring determines the effectiveness of environmental controls in preventing unplanned spread of contamination from facilities and sites operated by Westinghouse Hanford for DOE. Effluent monitoring and reporting, monitoring of surplus and waste management units, and monitoring near-field environmental media are, therefore, conducted by Westinghouse Hanford for controlling operations, determining the effectiveness of facility effluent controls, measuring the adequacy of containment at waste transportation and disposal units, detecting and monitoring upset conditions, and evaluating and upgrading effluent monitoring capabilities.

## 11.3 BASIS

Near-field environmental surveillance is conducted to (1) monitor employee protection; (2) monitor environmental protection; and (3) ensure compliance with local, state, and federal regulations. Compliance with parts of DOE Orders 5400.1, *General Environmental Protection Program* (DOE 1988); 5400.5, *Radiation Protection of the Public and the Environment* (DOE 1990b); 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements* (DOE 1981); 5820.2A, *Radioactive Waste Management*; (DOE 1990c) and DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (DOE 1991), are addressed through this activity.

## 11.4 MEDIA SAMPLED AND ANALYSES PERFORMED

Procedure protocols for sampling, analysis, data handling, and reporting are specified in WHC-CM-7-4 (WHC 1988). Media include ambient air, surface

water, groundwater, external radiation dose, soil, sediment, vegetation, and animals at or near active and inactive facilities and/or waste sites. Parameters monitored include the following, as needed: pH, water temperature, radionuclides, radiation exposure, and hazardous constituents. Animals that are not contaminated, as determined by a field instrument survey, are released at the capture location.

## 11.5 LOCATIONS

Samples are collected from known or suspected effluent pathways (e.g., downwind of potential releases, liquid streams, or proximal to release points). To avoid duplication, Westinghouse Hanford relies upon existing sample locations where PNL has previously established sample sites (e.g., air samplers in the 300 Area). There are 38 air samplers (4 in the 100 Area and 34 in the 200/600 Areas), 35 surface water sample sites (22 in the 100 Area and 13 in the 200/600 Areas), 110 groundwater monitoring wells (20 in the 100 Area, 89 in the 200/600 Areas, and 1 in the 300/400 Areas), 299 external radiation monitor points (182 survey points and 41 thermoluminescent dosimetry (TLD) sites in the 100 Area, 61 TLD sites in the 200/600 Areas, and 15 TLD sites in the 300/400 Areas), 157 soil sample sites (32 in the 100 Area, 110 in the 200/600 Areas, and 15 in the 300/400 Areas), and 95 vegetation sample sites (40 in the 100 Area, 40 in the 200/600 Areas, and 15 in the 300/400 Areas). Animal samples are collected at or near facilities and/or waste sites. Specific locations of sample sites are found in WHC-CM-7-4 (WHC 1988).

Additionally, surveys to detect surface radiological contamination, scheduled in WHC-CM-7-4, are conducted near and on liquid waste disposal sites (e.g., cribs, trenches, drains, retention basin perimeters, pond perimeters, and ditch banks), solid waste disposal sites (e.g., burial grounds and trenches), unplanned release sites, tank farm perimeters, stabilized waste disposal sites, roads, and firebreaks in the Operations Areas. There are 391 sites in the Operations Areas (100 in the 100 Area, 273 in the 200/600 Areas, and 18 in the 300/400 Areas) where radiological surveys are conducted.

## 11.6 PROGRAM REVIEW

The near-field (operational environmental) monitoring program will be reviewed at least annually to determine that the appropriate effluents are being monitored and that the monitor locations are in position to best determine potential releases.

## 11.7 SAMPLER DESIGN

Sampler design (e.g., air monitors) will be reviewed at least biannually to determine equipment efficiency and compliance with current EPA and industry [e.g., American National Standards Institute and American Society for Testing and Materials] standards.

## 11.8 COMMUNICATION

The Operations and Engineering Contractor and the Research and Development Contractor will compare and communicate results of their respective monitoring programs at least quarterly and as soon as possible under upset conditions.

## 11.9 REPORTS

Results of the near-field operational environmental monitoring program are published in the document series WHC-EP-0145, *Westinghouse Hanford Company Environmental Surveillance Annual Report* (WHC 1991d). The radionuclide values in these reports are expressed in curies, or portions thereof, for each radionuclide per unit weight of sample (e.g., picocuries per gram) or in field instrument values (e.g., counts per minute) rather than EDE, which is calculated as the summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor.

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# 12.0 QUALITY ASSURANCE

## 12.1 PURPOSE

The Quality Assurance (QA) plan implements the overall QA Program requirements defined in WHC-CM-4-2, *Quality Assurance Manual* (WHC 1991e). This QA plan shall be consistent with the requirements in DOE 5700.6B, "Quality Assurance" (DOE 1986). In addition, the QA requirements in 40 CFR 60, *Appendix A*, "Reference Methodologies" (EPA 1990) shall be considered when performing monitoring calculations and establishing monitoring systems.

## 12.2 OBJECTIVE

This plan provides a documented QA plan describing QA requirements for the FEMP.

## 12.3 REQUIREMENTS

A Quality Assurance Project Plan (QAPP) describes the QA requirements of the overall QA program. The QAPP applies specifically to the activities associated with implementing the FEMP (WHC 1991b). Engineering, Health and Safety, Quality Assurance, and Environmental Protection organizations shall evaluate engineered systems that provide radiological and hazardous material safety to the public, employees, and environment and/or operational success. Their evaluations shall identify areas of significant concern requiring the development of QA verification plans. A facility-specific QA plan will be provided when available and incorporated into the next revision.

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## 13.0 INTERNAL AND EXTERNAL PLAN REVIEW

The DOE Order 5400.1, "General Environmental Protection Program," Chapter IV (DOE 1988) requires the FEMP be reviewed annually and updated every 3 yr. The FEMP should be reviewed and updated as necessary after each major change or modification in the facility processes, structure, ventilation and liquid collection systems, monitoring equipment, waste treatment, or significant change to the Safety Analysis Reports. In addition, EPA regulations require that records on the results of radioactive airborne emissions monitoring be maintained on site for 5 yr. Operations management shall maintain records of reports on measurements of stack particulate or other nonradioactive hazardous pollutant emissions for 3 yr.

Facility operators will have to certify on a semiannual basis that no changes in operations which require new testing have occurred. Although the report is based on the calendar year, the emission limits apply to any period of 12 consecutive months. The Westinghouse Hanford Environmental Protection prepares an annual effluent discharges report for each area on the Hanford Site to cover both airborne and liquid release pathways. In addition, a report on the air emissions and compliance to the NESHAPs is prepared by Environmental Protection and submitted to EPA as well as DOE.

Facility management obtains the environmental protection function's approval for all changes to the FEMPs, including those generated in the annual review and update. In addition, the FEMPs shall be reviewed by QA.

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## 14.0 COMPLIANCE ASSESSMENT

A compliance assessment has not been performed and documented on the wastewater effluent stream for the Laundry Facility. An assessment will be performed, documented, and incorporated in the next subsequent revision.

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## 15.0 SUMMARY

For discharge of hazardous material, the 2724-W facility wastewater stream has been evaluated (WHC 1990a) and determined not to be a dangerous waste in accordance with the procedure defined in WAC 173-303 (Ecology 1989a). However, this wastewater stream does have measurable quantities of radionuclides that require a monitoring program.

It is proposed in this FEMP that the wastewater samples be taken at a rate of 100 mL (3 oz) per sample at a flow rate of one sample per 3,785 L (1,000 gal). A sample of 400 mL (12 oz) per day is to be combined to accumulate a weekly 2.0 L (60 oz) sample required for Westinghouse Hanford 222-S Analytical Laboratory minimum sample volumes.

Based on the radionuclide history, the wastewater stream will be analyzed for the following:

- $^{60}Co$
- $^{90}Sr$
- $^{99}Tc$
- $^{129}I$
- $^{137}Cs$
- $^{210}Pb$
- $^{228}Ra$
- $^{234}U$
- $^{235}U$
- $^{238}U$
- $^{238}Pu$
- $^{239/240}Pu$
- $^{241}Am$
- $^{244}Cm$
- Gross Alpha
- Gross Beta
- Gross Uranium.

Because this FEMP is a living document, data will be reviewed annually against regulatory criteria for compliance verification. If required, any future modifications will be approved by Environmental Protection and QA.

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# 16.0 ATTACHMENTS

## 16.1 REFERENCES

APCA, 1980, *General Regulation 80-7 of the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority* (APCA), Board of Directors of the Benton-Franklin-Walla Walla Counties Air Pollution Control Authority, Richland, Washington.

Brown, M. J., et al., 1990, *Westinghouse Hanford Company Effluent Discharges and Solid Waste Management Report for Calendar Year 1989*: 200/600 Areas, WHC-EP-0141-2, Westinghouse Hanford Company, Richland, Washington.

*Clean Air Act of 1977*, as amended, 41 USC 7401.

*Clean Water Act of 1977*, as amended, 33 USC 7401.

*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, as amended, Public Law 96-510, 94 stat. 2767, 42 USC 9601 et seq.

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EPA, 1988, *Emergency Planning and Notification*, Title 40 Code of Federal Regulations, Part 355, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989a, *National Emissions Standards for Hazardous Air Pollutants, Office of the Federal Register*, Title 40 Code of Federal Regulations, Part 61, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989b, *Designation, Reportable Quantities, and Notification*, Title 40, Code of Federal Regulations, Part 302, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989c, *National Interim Primary Drinking Water Regulations*, Title 40, Code of Federal Regulations, 40 CFR Part 141, as amended, U.S. Environmental Protection Agency, Washington, D.C.

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