HNF-7469
Revision 1

Facility Effluent Monitoring Plan Determination for the Waste Sampling and characterization Facility

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

Fluor Hanford
P.O. Box 1000
Richland, Washington

2-7-01

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REPLACEMENT FOR THE DETERMINATION OF FACILITY EFFLUENT MONITORING PLAN REQUIREMENT SHEET - ATTACHMENT **2-1** OF FACILITY EFFLUENT MONITORING PLAN DETERMINATION FOR THE WASTE SAMPLING AND CHARACTERIZATION FACILITY (HNF-EP-7469)

Attached is the Determination of Facility Effluent Monitoring Plan (FEMP) Requirement Sheet. This Sheet is a replacement for the sheet, which is in your FEMP determination document titled "Facility Effluent Monitoring Plan Determination **for** the Waste Characterization Facility" now on page ATT 2-1. This sheet was changed to include the required approval signatures.

If you have any questions please call me on 373-4306.

Sincerely,

Thomas P. Frazier

Thomas P. Frazier, Environmental Scientist
Compliance Field Services

slm

Attachment

FH-0101536

Attachment

Determination of Facility Effluent Monitoring Plan Requirements

Consisting of 2 pages, including coversheet

ATTACHMENT 2

DETERMINATION OF FACILITY EFFLUENT MONITORING PLAN REQUIREMENT

FACILITY: Waste Sampling and Characterization Facility

DISCHARGE POINT(S): Main Laboratory Building - 696-W-1 Stack
NSL Counting Room - 696-W-2 Stack
Environmental Sample Archive Facility (6267 Building)
Mobile Laboratory Storage Facility (6269 Building)
Wastewater Storage Tank Facility (6266A Building)
Portable Tanker Trucks for Wastewater Transport

FACILITY INVENTORY AT RISK OF RADIOACTIVE **MATERIALS**

	Radionuclide	Physical/chemical form	Quantity (curies)	Quantity released	Projected dose (mrem/yr)
1	^{239}Pu	Particulates	1.68 E+00	1.68 **E-03**	1.07 E-02
2	^{90}Sr	Particulates	3.47 E+01	3.47 E-02	3.06 E-03
Total					**1.38** E-02

FACILITY INVENTORY AT RISK OF NONRADIOACTIVE **HAZARDOUS MATERIALS**

Regulated material	Quantity (pounds)	Quantity released	Reportable quantity (pounds)	% of Reportable quantity/year

1. Refer to Attachment 1, Table 1.
   NOTE: Inventory limits are no greater than 50% of established RQs for any chemical in stock and could not lead to a reportable event.

Identification **of** Reference Material

*Refer to text. Section 5.0 for references.

*Calculations using EPA-approved computer dose model (AIRDOS/RADRISK/CAP-88)

If the total projected dose from radionuclides exceeds 0.1 mrem estimated dose equivalent from any one discharge point or if any one regulated material discharged from a facility exceeds 100% of a RQ or a permitted quantity, a FEMP is required for that facility. Check the appropriate space below.

FEMP is required _____ FEMP **is** not required X

Evaluator R J Boom Date 2/27/01
FH Environmental Services T.M. Kidwell 2/28/01 Date 2-28-01
Facility Manager [signature] Date 2/27/01

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Fluor Hanford
P.O. Box 1000
Richland, Washington

Chris Millingham 2-7-01
Release Approval **Date**

CONTENTS

ATTACHMENTS

TERMS

APQ	annual possession quantity
CAA	*Clean Air Aci of 1977*
CERCLA	*Coniprehensive Environmental Response, Compensaiion, ond Liability Aci of 1980*
cfm	cubic feet per minute
CWA	*Clean Water Act of 1977*
EDRT	Environmental Data Remedial Tracking System
ESAF	Environmental Sample Archive Facility
FEMP	facility effluent monitoring plan
HEPA	high-efficiency particulate air
HVAC	heating. ventilation, and air conditioning
MLSF	Mobile Laboratory Storage Facility
NSL	Nuclear Spectroscopy Laboratory
RCRA	*Resource Conservation and Recovery Act of 1976*
RQ	reportable quantity
SDWA	*Safe Drinking Water Aci of 1974*
TSCA	*Toxic Substance Control Act of 1976*
WSCF	Waste Sampling and Characterization Facility

METRIC CONVERSION CHART

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			**Energy**		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.948	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			**Force/Pressure**		
pounds per square inch	6.895	kilopascals	kilopascals	0.14504	pounds per square inch

Source: *Engineering Unit* ***Conversions,*** M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

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FACILITY EFFLUENT MONITORING PLAN DETERMINATION FOR THE WASTE SAMPLING AND CHARACTERIZATION FACILITY

1.0 INTRODUCTION

This report presents material required for the facility effluent monitoring plan (FEMP) determination for the Waste Sampling and Characterization Facility (WSCF) Analytical Laboratory. Information discussed in the first four sections of "A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans" (WHC-EP-0438-1) is contained in this document and includes the following:

- Introductory material - definitions of terms that might be used in the guidance material; regulations; standards; brief facility/process description; characterization of potential source terms; and description of effluent paths, or references from which the facility description or effluent information is obtained

- Regulations and standards applicable to effluent releases and monitoring

- Information that was used in preparing the FEMP Determination Forms (Attachment 2)

2.0 FACILITY DESCRIPTION/STATUS OF OPERATION

WSCF is located in the 600 Area, immediately east of the 200 West Area on Route 3. WSCF contains a number of buildings including a main laboratory (6266 Building), and a number of ancillary buildings and structures.

The 6266 Building is a single-story, aboveground structure with a subterranean working level and a laboratory wing attached on the north wall of the main or core building. The building is divided into an analytical laboratory wing. a Nuclear Specrroscopy Laboratory (NSL) (subterranean level) for counting radioisotopes, and a core section for supporting analytical activity.

The core section contains office space, a conference room. mens/womens restroomlchange rooms, reception area, lunchroom/kitchen, record storage rooms, databank, and provides the most direct access to the NSL and the laboratory wing. The core section is maintained free from radioactivity and toxic chemicals and has its own ventilation system. The NSL contains nuclear detection equipment for isotopic identification and quantification of radionuclides required by the customer. The NSL level is connected to the first floor laboratory wing by a dumbwaiter, and contains an instrument repair shop, an electrical service room, and a filter bank room. The NSL also has its own ventilation system.

The laboratory wing contains separate laboratory workrooms, which are supplied with pressurized gases, hoods and benches, ventilation, electrical service, water service, and process vacuum, all on an 'as required' basis. Above the laboratory wing is a piping and ventilation gallery, which provides just enough space for adequate maintenance.

There is a small second level on the north end of the laboratory wing and adjacent to the exhaust stack mechanical room. The second level houses some exhaust control equipment and provides access to the ventilation gallery above the laboratory wing. The stack mechanical room/area houses supply and exhaust fans, filter banks, and air conditioning equipment for the laboratory wing. This equipment area is maintained free of radioactive contamination.

and very low-level radioactive samples. The ESAF is not inhabited regularly. The ESAF also provides temporary storage of drums or other waste packages containing **low** levels of radioactive material in accordance with applicable laboratory procedures. Less than 100 drums are stored at any one time.

A description of the source term and a description of the effluent control and monitoring equipment are provided in the following sections.

3.1 BRIEF DESCRIPTION OF THE SOURCE TERM, INCLUDING MAJOR RADIONUCLIDES INVOLVED AND EXPECTED RELEASE RATES

Those radionuclides that have been estimated to contribute greater than 10 percent of the potential-to-emit (PTE) total effective dose equivalent (TEDE) to the maximally exposed individual (MEI) are identified as cobalt-60, strontium-90, cesium-137, and plutonium-239. Though the identified radionuclides most conservatively represent the potential for any offsite exposure from the emission of radionuclides, it is possible that any of the balance of the radionuclides on the periodic table could contribute to the emissions from WSCF

Subsequent to commencement of operations, administrative limits were established for handling radioactively contaminated samples in WSCF. The annual possession quantity (APQ) values, resultant potential emissions, and subsequent potential offsite dose consequences are based on the following:

- Alpha emitters (plutonium-239 as radionuclide ofconcern) - 0.33 curie per year
- Beta/gamma emitters (strontium-90 as radionuclide of concern) - 6.80 curies per year.

Because radioactive contaminated materials could be handled within more than one of the WSCF emission units, the APQ for each emission unit is estimated as follows.

- Analytical laboratory – Upto the entire maximum facility throughput could be handled per year, such that the APQ for this emission unit conservatively is estimated as 0.33 curie per year plutonium-239 and 6.80 curies per year strontium-90.
- Radiochemistry laboratory – Up to the entire maximum facility throughput could be handled per year, such that the APQ for this emission unit conservatively is estimated as 0.33 curie per year plutonium-239 and 6.80 curies per year strontium-90.
- ESAF – Storage at this location could involve up to the maximum annual throughput, such that the APQ for this emission unit conservatively is estimated as 0.33 curie per year plutoniuni-239 and 6.80 curies per year strontium-90.
- MLSF – Housing of up to five mobile laboratories (sample trucks) and operation of the calibration laboratory conservatively is estimated to involve an APQ of up to 10 percent of the WSCF throughput per year. This results in 0.03 curie per year plutonium-239 and 0.68 curie per year strontium-90:
- 6265A Building – This open-sided building provides for temporary holding of solid waste contained in drums or other waste packages containing low levels of radioactive material. Less than 100 drums are stored at any one time. This storage is approved under the Hanford Site NOC for vented containers (attached).
- 6266A Building – The two 3,785-liter polyethylene tanks are vented, and could receive in any year the equivalent of the maximum annual analytical laboratory throughput, such that the APQ for this emission unit is conservatively estimated as 0.33 curie per year plutonium-239 and 6.80 curies per year strontium-90.
- Portable tanker(s) used for wastewater transport - The combined use of the portable tankers could involve handling in any year an APQ of 0.33 curie per year plutonium-239 and 6.80 curies per year strontium-90.

3.2 PROVIDE A DESCRIPTION OF THE EFFLUENT CONTROL AND MONITORING EQUIPMENT

Effluent control and effluent monitoring are discussed in the following sections,

3.2.1 Effluent Control

Analytical laboratory - The main ventilation system for WSCF operates at a negative pressure with respect to atmosphere. Airflow is from the area of least contamination potential to the area of greatest contamination potential (fume hoods) and into the heating, ventilation, and air conditioning (HVAC) system. The analysis/preparation rooms operated at a negative **0.2** inch-water gauge pressure with respect to atmosphere. The counting rooms, where sealed source radio assay work is done, is operated at a negative 0.1 inch water gauge pressure with respect to atmosphere.

The HVAC system capacity is 1,528.2 cubic meters per minute (cmm) through the **696-W-1** Stack.

All eshaust air is prefiltered and high-efficiency particulate air (HEPA) filtered (single stage) before entering the exhaust stack. The prefilter is a high-density, micro-fiber with an average efficiency of **25%** to **30%.** The HEPA filter assembly housings have bagout provisions. Prefilter housings are designed for ease of filter change without increased dust loading of the HEPA filter. Two **50%** capacity exhaust fans operate in parallel under normal power. In the event normal power is lost, emergency power is provided to at least one of the exhaust fans.

The **696-W-1** Stack height is 13 meters, with a diameter of **1.37** meters. Average effluent temperature is 21.1°C and the stack gas velocity averages 17.4 meters per second.

Radiochemistry Laboratory - The belowgrade counting room is ventilated separately, via the **696-W-2** Stack. Once the ventilation air exits the counting room building, ventilation divides into hvo legs. Each leg of the parallel system consists of a damper, a prefilter, a HEPA filter bank (4X3), and a damper. The installed HEPA filtration provides a minimum collection efficiency of **99.95%** for particles with a median diameter of **0.3** micron. After the air passes through the parallel system, the legs join together and pass through the fan. The airflow is divided into hvo paths, with 10% of the airflow exhausting directly to the stack, and the other **90%** of flow recycling back into the building. The damper and fan regulate the flow. The rectangular stack is 13 meters in height, with dimensions of 0.33 meter times **0.94** meter. Average stack effluent temperature is 16.7°C, and stack gas velocity averages **3.1** meters per second. Average volumetric flow rate is less than **56.6** cmm. During maintenance, or in the event of loss of normal electrical power (during which time backup electrical generation is used), the rate of flow through the ventilation system could be reduced to approsimately **50%** of normal flow, while still maintaining normal airflow direction.

ESAF – Emissions are controlled by the structure itself, with no containment efficiency provided by the ventilation system. Packaging of the archived samples and monitored storage of the closed (unvented) drums and approved low-level waste packages, combined with minimization of any indoor contamination in accordance with established radiation control procedures, provides for effective control of potential fugitive emissions.

MLSF – The contained design of the mobile laboratories, combined with minimization of any indoor contamination, in accordance with established radiation control procedures, provides for effective control of potential fugitive emissions from this emissions unit.

6265A Building - Emissions from this open-sided weather shelter are controlled by the waste packages. Containment provided by the stored drums and other waste packages, combined with minimization of any external contamination in accordance with established radiation control procedures, provides for effective control of potential fugitive emissions.

6266A Building – Emissions are contained by the design of the two closed tanks. Each of the hvo installed 3,785 liter tanks is fitted with a passive vent fitted with a HEPA-type filter. Potential emissions during storage, pumping, and filling of the tanks are controlled further by the very moist conditions in the tank, and the gradual air displacement that occurs.

Portable tanker(s) used for wastewater transport. Passive venting of the portable tanker(s) is accomplished using small vent pipes or open cupolas during filling. Potential emissions during pumping and storage are controlled by the very moist conditions in the tanker, and the gradual air displacement that occurs.

3.2.2 Effluent Monitoring

Radioactive airborne emissions measurements are performed by periodically sampling the effluent emitted from the 696-W-1 and 696-W-2 Stacks during periods representing normal operations. Samples are withdrawn using a vacuum powered sample device. Samples are collected on particulate air filters providing a high degree of collection efficiency. On completion of each sample collection period, the particulate air filters are removed for analysis to determine gross alpha/beta activity. Periodic sampling for the 696-W-1 and 696-W-2 Stacks is provided, at a minimum, on a calendar quarter (a sample is withdrawn a minimum of 2 weeks per quarter).

Periodic confirmatory measurements to verify low fugitive emissions from the ESAF, the MLSF, the 6265A Building, the 6266A Building, and during the tanker filling operations are provided by periodic radiological surveys of swipes or surfaces associated with points providing a potential for fugitive emissions. Surveys of the swipes and/or surfaces are conducted using handheld survey instruments.

4.0 DISCUSSION OF FACILITY CHEMICAL INVENTORY AT RISK AS DESCRIBED IN WHC-EP-0438-1

WSCF will not store material identified in the 40 CFR 302.4 table of hazardous chemicals in quantities equaling or exceeding the reportable quantity (RQ) amount for any 12-month period. The chemical supplies listed in Attachment 1, Table I, represent those chemicals listed on the 40 CFR 302.4 table and the approximate storage quantities. Chemical supplies are updated from existing inventory maintained at the 222-SA Standards Laboratory in the 200 West Area only on an 'as required' basis.

All chemicals used in support of analysis and declared waste are packaged according to hazard class or drained to less than 90-day accumulation tanks (Section *2.0).* Piping and accumulation areas are protected by secondary containment. The credibility of a direct release to the environment by any primary failure is not considered likely and therefore is not addressed in this document.

5.0 REFERENCES

HNF-3602, Volume 1: Calculating Potential to Emit Releases and Doses for FEMPs and NOCs, Fluor Daniel Hanford Inc., Richland, Washington

ATTACHMENT 1

8E750-95-001

REPRESENTATIVE CHEMICALS ON 40 CFR 302.4 TABLE.

Regulated material	Quantity (kilogram)	Reportable quantity (kilogram)
Acetic acid	227	2270
Acetone	227	2270
Ammonium bichromate	.454	4.54
Ammonium hydroxide	45.5	454
Calcium hypochlorite	.454	4.54
Carbon tetrachloride	.454	4.54
Hydrochloric acid	227	2270
Lead (II) nitrate	4.54	45.4
Methanol	227	2270
Methyl isobutyl ketone	227	2270
Methylene chloride	227*	454
Nickel (II) nitrate	4.54	45.4
Nitric acid	227*	454
Phosphoric acid	227	2270
Potassium bichromate	.454	4.54
Potassium hydroxide	45.4	454
Potassium cyanide	< .454	4.54
Potassium dichromate	< .454	4.54
Pyridine	45.4	454
Silver (I) nitrate (10%)	< .454	4.54 (10 at 10% sol.)
Sodium bisulfite or	227	2270
Sodium bichromate	.454	4.54
Sodium fluoride	45.4	454
Sodium hydroxide	45.4	454
Sodium hypochlorite	4.54	45.4
Sodium nitrite	4.54	45.4
Sulfuric acid	45.4	454
Trichloroethylene	< 4.54	45.4
Xylene (solution)	45.4	454
Zinc	45.4	454

* Those items identified with an asterisk are maintained at a higher inventory level because use is more frequent and necessary than others listed.

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ATTACHMENT 2

DETERMINATION OF FACILITY EFFLUENT MONITORING PLAN REQUIREMENT

	Radionuclide	Physical/chemical form	Quantity (curies)	Quantity released	Projected dose (mrem/yr)
1	^{239}Pu	Particulates	1.68 E+00	1.68 E-03	1.07 E-02
2	^{90}Sr	Particulates	3.47 E+01	**3.47** E-02	3.06 E-03
Total					1.38 E-02

FACILITY INVENTORY AT RISK OF NONRADIOACTIVE HAZARDOUS MATERIALS

Regulated material	Quantity (pounds)	Quantity released	Reportable quantity (pounds)	% of Reportable quantity/year

1. Refer to Attachment 1, Table 1.
   NOTE: Inventory limits are **no** greater than 50% of established RQs for any chemical in stock and could not lead to a reportable event.

Identification of Reference Material

*Refer to text. Section 5.0 for references.

*Calculations using EPA-approved computer dose model (AIRDOS/RADRISK/CAP-88)

If the total projected dose from radionuclides exceeds 0.1 mrem estimated dose equivalent from any one discharge point or if any one regulated material discharged from a facility exceeds 100% of a RQ or a permitted quantity, a FEMP is required for that facility. Check the appropriate space below.

FEMP is required _____ FEMP is not required ____X___

Evaluator _____ Date _____
FH Environmental Services_____ Date _____
Facility Manager _____ Date _____

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