INFORMATION CLEARANCE FORM

COPY OF
ORIGINAL

A. Information Category ☐ Abstract ☐ Journal Article ☐ Summary ☐ Internet ☐ Visual Aid ☐ Software ☐ Full Paper ☐ Report ☒ Other _____		B. Document Number DOE/RL-2000-04 Rev. 0 C. Title Radioactive Air Emissions Notice of Construction Application for the Waste Sampling and Characterization Facility																																					
E. Required Information 1. Is document potentially Classified? ☒ No ☐ Yes (MANDATORY) <u>4-18-00</u> Manager's Signature Required _____ If Yes _____ ☐ No ☐ Yes Classified ADC Signature Required _____ 2. Internal Review Required? ☒ No ☐ Yes If Yes, Document Signatures Below Counsel _____ Program _____ 3. References in the Information are Applied Technology ☒ No ☐ Yes Export Controlled Information ☐ No ☐ Yes		D. Internet Address 4. Does Information Contain the Following: (MANDATORY) a. New or Novel (Patentable) Subject Matter? ☐ No ☐ Yes If "Yes", Disclosure No.: _____ b. Information Received in Confidence, Such as Proprietary and/or Inventions? ☒ No ☐ Yes If "Yes", Affix Appropriate Legends/Notices. c. Copyrights? ☐ No ☐ Yes If "Yes", Attach Permission. d. Trademarks? ☐ No ☒ Yes If "Yes", Identify in Document. 5. Is Information requiring submission to OSTI? ☐ No ☐ Yes If Yes UC- 630 and B&R- _____ 6. Release Level? ☐ Public ☐ Limited 7. Charge Code 4328-12/22																																					
F. Complete for a Journal Article 1. Title of Journal 2																																							
G. Complete for a Presentation 1. Title for Conference or Meeting _____ 2. Group Sponsoring _____ 3. Date of Conference _____ 4. City/State _____ 5. Will Information be Published in Proceedings? ☐ No ☐ Yes 6. Will Material be Handed Out? ☐ No ☐ Yes																																							
H. Author/Requestor J A Bates (Print and Sign) <u>J. A. Bates</u>		Responsible Manager <u>4-18-00</u> (Print and Sign) <u>R. H. Engelmann</u>																																					
I. Reviewers <table border="0" style="width:100%;"> <tr> <th style="text-align: left;">Yes</th> <th style="text-align: left;">Print</th> <th style="text-align: left;">Signature</th> <th style="text-align: left;">Public Y/N (If N, complete J)</th> </tr> <tr> <td>☒</td> <td>L F Willis</td> <td><u>[Signature]</u></td> <td>Y / N</td> </tr> <tr> <td>☐</td> <td></td> <td></td> <td>Y / N</td> </tr> <tr> <td>☒</td> <td>PK Clark</td> <td><u>[Signature]</u></td> <td>Y / N</td> </tr> <tr> <td>☐</td> <td></td> <td></td> <td>Y / N</td> </tr> <tr> <td>☐</td> <td></td> <td></td> <td>Y / N</td> </tr> </table>		Yes	Print	Signature	Public Y/N (If N, complete J)	☒	L F Willis	<u>[Signature]</u>	Y / N	☐			Y / N	☒	PK Clark	<u>[Signature]</u>	Y / N	☐			Y / N	☐			Y / N	J. If Information Includes Sensitive Information and is not to be released to the Public indicate category below. <table border="0" style="width:100%;"> <tr> <td>☐ Applied Technology</td> <td>☐ Protected CRADA</td> </tr> <tr> <td>☐ Personal/Private</td> <td>☐ Export Controlled</td> </tr> <tr> <td>☐ Proprietary</td> <td>☐ Procurement-Sensitive</td> </tr> <tr> <td>☐ Business-Sensitive</td> <td>☐ Patentable</td> </tr> <tr> <td>☐ Predecisional</td> <td>☐ Other (Specify) _____</td> </tr> <tr> <td>☐ UCNi</td> <td></td> </tr> </table>		☐ Applied Technology	☐ Protected CRADA	☐ Personal/Private	☐ Export Controlled	☐ Proprietary	☐ Procurement-Sensitive	☐ Business-Sensitive	☐ Patentable	☐ Predecisional	☐ Other (Specify) _____	☐ UCNi	
Yes	Print	Signature	Public Y/N (If N, complete J)																																				
☒	L F Willis	<u>[Signature]</u>	Y / N																																				
☐			Y / N																																				
☒	PK Clark	<u>[Signature]</u>	Y / N																																				
☐			Y / N																																				
☐			Y / N																																				
☐ Applied Technology	☐ Protected CRADA																																						
☐ Personal/Private	☐ Export Controlled																																						
☐ Proprietary	☐ Procurement-Sensitive																																						
☐ Business-Sensitive	☐ Patentable																																						
☐ Predecisional	☐ Other (Specify) _____																																						
☐ UCNi																																							
K. If Additional Comments, Please Attach Separate Sheet

Radioactive Air Emissions Notice of Construction Application 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

**United States
Department of Energy**

P.O. Box 550
Richland, Washington 99352

Radioactive Air Emissions Notice of Construction Application for the Waste Sampling and Characterization Facility

Date Published
April 2000

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

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

Christine Killenham 5-1-00
Release Approval Date

LEGAL DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced from the best available copy.

Printed in the United States of America

CONTENTS

1		
2		
3		
4	TERMS	v
5		
6	METRIC CONVERSION CHART.....	vi
7		
8	NOTICE OF CONSTRUCTION HISTORY	vii
9		
10	1.0 LOCATION.....	1
11		
12	2.0 RESPONSIBLE MANAGER.....	1
13		
14	3.0 PROPOSED ACTIONS	2
15		
16	4.0 STATE ENVIRONMENTAL POLICY ACT.....	2
17		
18	5.0 CHEMICAL AND PHYSICAL PROCESSES	2
19		
20	6.0 PROPOSED CONTROLS.....	3
21		
22	7.0 DRAWINGS OF CONTROLS	5
23		
24	8.0 RADIONUCLIDES OF CONCERN.....	5
25		
26	9.0 MONITORING	5
27		
28	10.0 ANNUAL POSSESSION QUANTITY	6
29		
30	11.0 PHYSICAL FORM	7
31		
32	12.0 RELEASE FORM	7
33		
34	13.0 RELEASE RATES.....	7
35		
36	14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL	7
37		
38	15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED	
39	INDIVIDUAL (Requirement 15).....	8
40		
41	16.0 COST FACTOR IF NO ANALYSIS	8
42		
43	17.0 DURATION OR LIFETIME	8
44		
45	18.0 STANDARDS	8
46		
47	19.0 REFERENCES	9
48		
49		

ATTACHMENT

As Low As Reasonably Achievable Control Technology Demonstration, and Notice of Construction and Best Available Radionuclide Control Technology Demonstration for Hanford Site Vented Containers.....	ATT-1
---	-------

FIGURES

Figure 1. Location of 696-W-1 and 696-W-2 Stacks in the 600 Area.....	F-1
Figure 2. Conceptual Drawing of 696-W-1 Control Technology Components.....	F-2
Figure 3. Conceptual Drawing of 696-W-2 Control Technology Components.....	F-3

TABLES

Table 1. Release Rates.....	T-1
Table 2. Unabated and Abated Total Effective Dose Equivalent to the Maximally Exposed Individual (in millirems per year).....	T-2
Table 3. Total Unabated and Abated Total Effective Dose Equivalent to the Maximally Exposed Individual.....	T-3

TERMS

1	
2	
3	
4	ALARACT
5	ANSI
6	AMSE
7	APQ
8	
9	BARCT
10	
11	Ci
12	
13	DOE-RL
14	
15	EPA
16	
17	HEPA
18	
19	MEI
20	mrem
21	
22	NOC
23	
24	PTE
25	
26	SEPA
27	
28	TEDE
29	
30	WAC
31	WDOH
32	WSCF

as low as reasonably achievable control technology

American National Standards Institute

American Society of Mechanical Engineers

annual possession quantity

best available radionuclide control technology

curie

U.S. Department of Energy, Richland Operations Office

U.S. Environmental Protection Agency

high-efficiency particulate air

maximally exposed individual

millirem

notice of construction

potential-to-emit

State Environmental Policy Act of 1971

total effective dose equivalent

Washington Administrative Code

Washington State Department of Health

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.

NOTICE OF CONSTRUCTION HISTORY

The original Notice of Construction was developed in accordance with guidance provided by the Washington State Department of Health, Environmental Protection Section, Division of Radiation Protection in a letter, R. R. Mooney to R. D. Izatt, U.S. Department of Energy, Richland Operations Office, dated February 20, 1990, for facilities emitting extremely low levels of airborne radionuclides (i.e., less than 1 percent of National Emissions Standards for Hazardous Air Pollutants limit of 10 millirem). Approval of the original Notice of Construction was received (letter EPS 90-275).

Six separate minor revisions to the original Notice of Construction were approved by Washington State Department of Health on January 19, 1999:

- Periodic confirmatory measurement of emissions from the 696-W-1 and 696-W-2 stacks
- Ranges of air temperature and relative humidity within the laboratories
- Normal and emergency ventilation fan capacities
- Air lock ventilation
- Sample dose rate limits
- Fume hood ventilation flows.

One additional minor revision was approved on March 11, 1999:

- Elimination of 10 millirem per hour sample acceptance criterion.

The revisions were processed using the Hanford Facility Notice of Construction revision form. The descriptions in this updated Notice of Construction replace the seven minor revisions. This updated Notice of Construction supercedes the original Notice of Construction in its entirety.

1
2
3
4
5

This page intentionally left blank.

**RADIOACTIVE AIR EMISSIONS
NOTICE OF CONSTRUCTION APPLICATION FOR THE
WASTE SAMPLING AND CHARACTERIZATION FACILITY**

This Notice of Construction (NOC) application updates the description of the amounts of radioactive material handled, the calculated potential for airborne emissions and resultant calculation of offsite total effective dose equivalent (TEDE), and the use of portable tanks to receive and remove low-level radioactive contaminated liquid waste from the Waste Sampling and Characterization Facility (WSCF) on the Hanford Site. This NOC reflects only an update of the descriptive information. There have been no actual increases in the airborne emissions or potential-to-emit (PTE) associated with WSCF operations.

For all combined emission units covered under this NOC, the unabated and abated TEDE to the hypothetical offsite maximally exposed individual (MEI) conservatively is estimated to total 1.4 E-02 millirem per year and 2.8 E-03 millirem per year, respectively.

The following text provides the information required to address Appendix A of Washington Administrative Code (WAC) 246-247 (requirements 1 through 18).

1.0 LOCATION

Name and address of the facility, and location (latitude and longitude) of the emission unit:

U.S. Department of Energy, Richland Operations Office
Hanford Site,
Richland, Washington

Waste Sampling and Characterization Facility, 600 Area

Latitude: 46° 33' 25.7" N

Longitude: 119° 36' 07.7" W

Figure 1 shows the location of WSCF within the 600 Area. The exhaust stacks are identified as 696-W-1 and 696-W-2.

2.0 RESPONSIBLE MANAGER

Name, title, address and phone number of the responsible manager:

Mr. S. H. Wisness, Director,
Office of Site Services
U.S. Department of Energy, Richland Operations Office
P.O. Box 550
Richland, Washington 99352
509-373-9337

3.0 PROPOSED ACTIONS

Identify the type and proposed action for which this application is submitted.

This NOC application is provided to update the description of amounts of material handled, and to update the calculation of potential for emissions and resultant calculation of offsite TEDE. This NOC also includes an updated description of the various emission units at WSCF, including use of portable tanks to receive and remove liquid waste contaminated with low levels of radioactive contamination.

The resultant, adjusted estimate for TEDE to the hypothetical MEI due to all combined unabated emissions from WSCF is 1.4 E-02 millirem per year. The total adjusted estimate for all combined abated emissions is 2.8 E-03 millirem per year. No single emission unit at the WSCF Complex exceeds a potential (unabated) offsite dose of 2.7 E-03 millirem per year.

4.0 STATE ENVIRONMENTAL POLICY ACT

If the project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone number.

The proposed action categorically is exempt from the requirements of the SEPA under WAC 197-11-845.

5.0 CHEMICAL AND PHYSICAL PROCESSES

Describe the chemical and physical processes upstream of the emission unit.

- WSCF provides analytical services to support chemical and radiological analyses conducted on a variety of solid, liquid, and vapor media, as required by the *Resource Conservation and Recovery Act (RCRA) of 1976, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Safe Drinking Water Act of 1974*, as well as the *Toxic Substance Control Act of 1976, Clean Water Act of 1977*, and *Clean Air Act of 1955* requirements. WSCF consists of the following:
 - Analytical laboratory building – Solid, liquid, and vapor samples contaminated with low levels of radioactive material are processed, on a bench-scale basis, in fume hoods or other controlled air spaces in the building. Evaporation and wet chemistry also are used to prepare samples for analysis. Wastewater drums are filled inside the laboratory building and transferred either to the solid waste storage building (described as follows) or other approved facilities on the Hanford Site, or the wastewater drums are moved to various locations within WSCF.
 - Radiochemistry laboratory - This is a belowgrade counting room in the analytical laboratory building with a separately controlled airspace within the building.
 - Environmental data building including a computer center – This is a nonradiological building and will not be addressed further.
 - Environmental sample archive building – This building provides for controlled storage, indexing, categorizing, and retrieval of low-level contaminated samples. Storage is provided for up to 2,500 samples requiring refrigerated storage and up to 11,500 samples requiring ambient storage.

- Mobile laboratory storage facility – This structure houses up to five mobile laboratories (sample trucks) and provides protection from adverse weather conditions for the instrumentation and computers inside the mobile laboratories. This area contains a calibration laboratory for instrumentation used in the mobile laboratories, and a sample preparation area for adding chemical buffers and preservatives to sample containers. This building also provides for temporary storage of drums, or other waste packages contaminated with low levels of radioactive material. Less than 100 drums are stored at any one time.
- Solid waste storage building – This open-sided building provides for temporary storage of drums or other low-level waste packages. Less than 100 drums are stored at any one time.
- Contaminated liquid waste retention vault – This vault consists of two 3,785-liter polyethylene tanks contained in a common concrete vault. The tanks are designed to receive low-level inorganic and radiologically contaminated liquid waste or sample excess from the analytical laboratory. The liquid routinely is transferred to an approved disposal facility on the Hanford Site using the portable tanker(s) described as follows. This building also provides for temporary storage of drums, or other waste packages contaminated with low levels of radioactive material. Less than 100 drums are stored at any one time.
- Portable tanker(s) used for wastewater transport -- Wastewater drums containing liquid waste contaminated with low levels of radioactive material are stored temporarily at various locations within WSCF. In some cases, the contents of these drums are pumped into a portable tanker at the various locations for transport to other facilities. To accomplish the pumping, a small pump has its drop leg inserted into each drum through the bung hole or other opening, and the liquid is transferred by flexible hose to the tanker.
- Sample equipment cleaning facility - This facility includes a calibration and laboratory equipment room equipped with a fume hood for solvent cleaning of tools used for collecting samples from the field. This is a nonradiological facility and will not be addressed further.

6.0 PROPOSED CONTROLS

Describe the existing and proposed abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate in cubic meters/second for the emission unit.

Analytical laboratory building - The main ventilation system for the laboratory complex operates at a negative pressure with respect to atmosphere. Thus, 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 are operated at a negative pressure with respect to atmosphere.

The HVAC system capacity is 54,000 cubic feet per minute through stack number 696-W-1. The airflow through the hoods is sufficient to ensure inflow during use.

All exhaust air is pre-filtered and high-efficiency particulate air (HEPA) filtered before entering the exhaust stack. The installed HEPA filtration provides a minimum collection efficiency of 99.95 percent for particles with a median diameter of 0.3 micron. The ventilation system exits the analytical laboratory building and divides into two legs. Each of the legs consists of a damper, a pre-filter, a HEPA filter bank

(4x3), a damper, and a fan. The pre-filter is a high-density micro-fiber media with an average efficiency of 25 to 30 percent. The HEPA filter assembly housings have bagout provisions. Pre-filter housings are designed for ease of filter change without increased dust loading of the HEPA. Two 50 percent capacity exhaust fans are installed and 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 - This belowgrade counting room is ventilated separately via the 696-W-2 stack. The ventilation air exits the counting room building and divides into two legs. Each leg of the parallel system consists of a damper, a pre-filter, a HEPA filter bank (4x3), and a damper. The installed HEPA filtration provides a minimum collection efficiency of 99.95 percent 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 two paths, with 10 percent of the airflow exhausting directly to the stack, and the other 90 percent 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 21.1°C, and stack gas velocity averages 3.1 meters per second. Average volumetric flowrate is less than 2,000 cubic feet per minute. 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 approximately 50 percent of normal flow, while still maintaining normal airflow direction.

Environmental sample archive building - Emissions are controlled by the structure itself, with no containment efficiency provided by the ventilation system. Packaging of the archived samples, combined with minimization of any indoor contamination in accordance with established radiation control procedures, provides for effective control of potential fugitive emissions.

Mobile laboratory storage facility - 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.

Solid waste storage 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.

Contaminated liquid waste retention vault - Emissions are contained by the design of the two closed tanks. Each of the two installed 3,785 liter tanks is fitted with a passive vent fitted with a HEPA-type high efficiency 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.

7.0 DRAWINGS OF CONTROLS

Provide conceptual drawings showing all applicable control technology components from the point of entry of radionuclides into the vapor space to release to the environment.

Figures 2 and 3 are sketches of the WSCF analytical laboratory radioactive airborne emissions control systems, associated with stack 696-W-1 and 696-W-2.

8.0 RADIONUCLIDES OF CONCERN

Identify each radionuclide that could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than 0.1 mrem/yr potential to emit TEDE to the MEI.

Those radionuclides that have been estimated to contribute greater than 10 percent of the PTE TEDE to the 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.

9.0 MONITORING

Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential to emit TEDE to the MEI, or greater than 0.1 mrem/yr potential to emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the MEI, after controls. Describe the method for monitoring or calculating those radionuclide emissions. Describe the method with sufficient detail to demonstrate compliance with the applicable requirements.

The proposed operations are subject to periodic confirmatory measurement requirements. Pursuant to these requirements, periodic confirmatory measurements are performed to verify low emissions. The measurements of the stack emissions also support the estimation of those emissions for annual reporting purposes.

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 frequency (meaning a sample is withdrawn a minimum of 2 weeks per quarter).

Periodic confirmatory measurements to verify low fugitive emissions from the environmental sample archive building, the mobile laboratory storage facility, the solid waste storage building, the liquid waste retention vault, 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.

10.0 ANNUAL POSSESSION QUANTITY

Indicate the annual possession quantity for each radionuclide.

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 of concern)--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 building – 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.
- 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.
- Environmental sample archive building – 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 plutonium-239 and 6.80 curies per year strontium-90.
- Mobile laboratory storage facility – 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 curies per year plutonium-239 and 0.68 curies per year strontium-90.
- Solid waste storage 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).
- Contaminated liquid waste retention vault – 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 one year an APQ of 0.33 curie per year plutonium-239 and 6.80 curies per year strontium-90.

11.0 PHYSICAL FORM

Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas.

The physical form of the representative plutonium-239 and strontium-90 radionuclides in the emission unit inventories will be particulate. The radionuclides comprising the actual inventory in the WSCF emission units will be of either particulate or liquid physical form, with an inconsequential fraction of the radionuclides being gaseous in form.

12.0 RELEASE FORM

Indicate the release form of each radionuclide in inventory: Particulate solids, vapor or gas. Give the chemical form and ICRP 30 solubility class, if known.

The release form of the representative plutonium-239 and strontium-90 radionuclides for the emission units will be particulate solids. The release form for the radionuclides comprising actual emissions from the WSCF emission units will be particulate solids, with an inconsequential fraction of the radionuclides being released in gaseous or vapor form.

13.0 RELEASE RATES

Give the predicted release rates without any emissions control equipment (potential to emit) and with the proposed control equipment using the efficiencies described in subsection (6) of this section. Indicate whether the emission unit is operating in a batch or continuous mode.

The release rates shown in the Table 1 are based on the APQ values for each emission unit, as listed in Section 10. The release fraction used for all units is the 1.0 E-03 fraction from 40 CFR 61, Appendix D, specified for particulate and/or liquid materials.

The annual abated release values reflect a conservative assumed decontamination factor of 2,000 for the single bank of HEPA filtration associated with the 696-W-1 and 696-W-2 stacks. Conservatively, no control efficiency is assumed for the pre-filters associated with each stack.

For all other emission units listed, except the portable waste water transport tankers, the abated release values reflect the conservative assumption that, annually, up to 1.0 percent of the stored or handled material could be found outside of its waste packaging and containment. Such material would then be available for potential airborne release to the ambient air.

For the portable waste water transport tankers, the 40 CFR 61, Appendix D, fraction of 1.0 E-3 is conservatively applied to all the radioactive contamination handled. No further controls are assumed.

14.0 LOCATION OF MAXIMALLY EXPOSED INDIVIDUAL

Identify the MEI by distance and direction from the emission unit.

The MEI is located approximately 22,000 meters east of the 200 West Area, as identified in HNF-3602, Volume 1.

15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED INDIVIDUAL (Requirement 15)

Calculate the TEDE to the MEI using an approved procedure. For each radionuclide identified in subsection (8) of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any existing controls using the release rates from subsection 13 of this section. Provide all input data used in the calculations.

The millirem per year TEDE results in Table 2 use the CAP88-PC dose conversion factors from HNF-3602. The dose conversion factor for plutonium-239, representing total alpha, is 6.4 E+00 millirem per curie. The factor for strontium-90, representing total beta/gamma, is 8.8 E-02 millirem per curie.

For each emission unit, Table 3 provides the total unabated and abated TEDE estimates for the MEI. The totals represent the sum of the alpha and beta/gamma contributions.

16.0 COST FACTOR IF NO ANALYSIS

Provide cost factors for construction, operation and maintenance of the proposed control technology components and the system, if a BARCT or ALARACT demonstration is not submitted with the NOC.

Pursuant to WAC 246-247-110, Appendix A (16), cost factors for construction, operation, and maintenance of proposed technology requirements are not required, as the following discussion is provided as an as low as reasonably achievable control technology (ALARACT) demonstration.

WDOH has provided guidance that HEPA filters generally are BARCT for particulate emissions (AIR 92-107). Because the radionuclides of concern are particulates, it is proposed that the controls described in Section 6.0 and approved for construction by WDOH on June 11, 1990, remain approved as ALARACT for WSCF activities.

17.0 DURATION OR LIFETIME

Provide an estimate of the lifetime for the facility process with the emission rates provided in this application.

WSCF operations are expected to continue for the duration of Hanford Site cleanup activities.

18.0 STANDARDS

Indicate which of the following control technology standards have been considered and will be complied with in the design and operation of the emission unit described in this application:

ASME/ANSI AG-1, ASME/ANSI N509, ASME/ANSI N510, ANSI/ASME NQA-1, 40 CFR 60, Appendix A Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1

For each standard not so indicated, give reasons to support adequacy of the design and operation of the emission unit as proposed.

The only two emission units addressed in this NOC application that involve control technology subject to the detailed standards are the 696-W-1 and 696-W-2 stacks. The activities described in this NOC have an estimated PTE for each emission unit of less than 0.1 millirem per year, using the release fractions set forth in Appendix D of 40 CFR 61, combined with additional, previously identified conservatisms.

The 696-W-1 and 696-W-2 stacks are registered emission units. The control technology associated with these stacks originally was constructed to structurally qualify as addressing the applicable requirements of the ASME/ANSI N509 and N510. However, the downstream test stations to allow collection efficiency testing of each HEPA filtration unit are not fully qualified with the standards. Therefore, each parallel leg (i.e., pre-filter and HEPA filter) is tested as one (refer to Figures 2 and 3 for parallel configuration). The estimates of abated emissions contained in this NOC only account for a single stage of HEPA filtration, with an assumed decontamination factor of 2,000 for particulates of 0.3 micron median diameter. This NOC does not reflect any modification of the existing control technology.

Quality assurance is addressed in HNF-0528-3, *NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions* (all of Sections 2.0, 3.0 and 5.0) as a compatible alternative to NQA-1.

19.0 REFERENCES

- AIR 92-107, Letter, A. W. Conklin, Washington State Department of Health, to J. D. Bauer, U.S. Department of Energy, Richland Operations Office, no subject, October 5, 1992.
- DOE/RL-95-07, Hanford Site Air Operating Permit Application, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- ESP 90-275, A.W. Conklin, Washington State Department of Health, to R. Izatt, U.S. Department of Energy, Richland Operations Office, June 11, 1990.
- HNF-0528, NESHAP Quality Assurance Project Plan for Radioactive Airborne Emissions, Fluor Daniel Hanford, Richland, Washington.
- HNF-3602, Volume 1: Calculating Potential to emit Releases and Doses for FEMPs and NOCs, Fluor Daniel Hanford, Inc., Richland, Washington.
- WDOH, 1990, R.R. Mooney, Washington State Department of Health, to R. D. Izatt, U.S. Department of Energy, Richland Operations Office, dated February 20, 1990.

1
2
3
4
5

This page intentionally left blank.

Building	Title
6265	Utility Building
6265A	Solid Waste Storage Building
6266 - North Portion	Analytical Laboratory Building
6266 - South Portion	Radiochemistry Laboratory
6266A	Contaminated Liquid Waste Retention Vault
6267	Environmental Sample Archive Building
6268	Sample Equipment Cleaning Facility
6269	Mobile Laboratory Storage Facility
6270	Environmental Data Remedial Tracking System
MO-280	Office Building

Figure 1. Location of 696-W-1 and 696-W-2 Stacks in the 600 Area.

Figure 2. Conceptual Drawing of 696-W-1 Control Technology Components.

Figure 2. Conceptual Drawing of 696-W-2 Control Technology Components

Figure 3. Conceptual Drawing of 696-W-2 Control Technology Components.

1
2
3
4
5

This page intentionally left blank.

Table 1. Release Rates.

Emission unit	Annual possession quantity	Release fraction	Annual release rate (unabated)	Annual release rate (abated)
Analytical laboratory building (Stack 696-W-1)	3.3 E-01 Ci Pu-239	1.0 E-03	3.3 E-04 Ci Pu-239	1.7 E-07 Ci Pu-239
	6.8 E+00 Ci Sr-90	1.0 E-03	6.8 E-03 Ci Sr-90	3.4 E-06 Ci Sr-90
Radiochemistry laboratory (Stack 696-W-2)	3.3 E-01 Ci Pu-239	1.0 E-03	3.3 E-04 Ci Pu-239	1.7 E-07 Ci Pu-239
	6.8 E+00 Ci Sr-90	1.0 E-03	6.8 E-03 Ci Sr-90	3.4 E-06 Ci Sr-90
Environmental sample archive building	3.3 E-01 Ci Pu-239	1.0 E-03	3.3 E-04 Ci Pu-239	3.3 E-06 Ci Pu-239
	6.8 E+00 Ci Sr-90	1.0 E-03	6.8 E-03 Ci Sr-90	6.8 E-05 Ci Sr-90
Mobile laboratory storage facility	3.3 E-02 Ci Pu-239	1.0 E-03	3.3 E-05 Ci Pu-239	3.3 E-07 Ci Pu-239
	6.8 E-01 Ci Sr-90	1.0 E-03	6.8 E-04 Ci Sr-90	6.8 E-06 Ci Sr-90
Contaminated liquid waste retention vault	3.3 E-01 Ci Pu-239	1.0 E-03	3.3 E-04 Ci Pu-239	3.3 E-06 Ci Pu-239
	6.8 E+00 Ci Sr-90	1.0 E-03	6.8 E-03 Ci Sr-90	6.8 E-05 Ci Sr-90
Vented tankers	3.3 E-01 Ci Pu-239	1.0 E-03	3.3 E-04 Ci Pu-239	3.3 E-04 Ci Pu-239
	6.8 E+00 Ci Sr-90	1.0 E-03	6.8 E-03 Ci Sr-90	6.8 E-03 Ci Sr-90

Table 2. Unabated and Abated Total Effective Dose Equivalent to the Maximally Exposed Individual
(in millirems per year).

Emission unit	Annual release rate (unabated)	Unabated TEDE to the MEI	Annual release rate (abated)	Abated TEDE to the MEI
Analytical laboratory building (Stack 696-W-1)	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr	1.7 E-07 Ci Pu-239	1.1 E-06 mrem/yr
	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr	3.4 E-06 Ci Sr-90	3.0 E-07 mrem/yr
Radiochemistry laboratory (Stack 696-W-2)	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr	1.7 E-07 Ci Pu-239	1.1 E-06 mrem/yr
	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr	3.4 E-06 Ci Sr-90	3.0 E-07 mrem/yr
Environmental Sample Archive Building	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr	3.3 E-06 Ci Pu-239	2.1 E-05 mrem/yr
	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr	6.8 E-05 Ci Sr-90	6.0 E-06 mrem/yr
Mobile laboratory storage facility	3.3 E-05 Ci Pu-239	2.1 E-04 mrem/yr	3.3 E-07 Ci Pu-239	2.1 E-06 mrem/yr
	6.8 E-04 Ci Sr-90	6.0 E-05 mrem/yr	6.8 E-06 Ci Sr-90	6.0 E-07 mrem/yr
Contaminated liquid waste retention vault	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr	3.3 E-06 Ci Pu-239	2.1 E-05 mrem/yr
	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr	6.8 E-05 Ci Sr-90	6.0 E-06 mrem/yr
Vented tankers	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr	3.3 E-04 Ci Pu-239	2.1 E-03 mrem/yr
	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr	6.8 E-03 Ci Sr-90	6.0 E-04 mrem/yr

Table 3. Total Unabated and Abated Total Effective Dose Equivalent to the Maximally Exposed Individual.

Emission unit	Total unabated TEDE to the MEI (millirem per year)	Total abated TEDE to the MEI (millirem per year)
Analytical laboratory building (Stack 696-W-1)	2.7 E-03	1.4 E-06
Radiochemistry laboratory (Stack 696-W-2)	2.7 E-03	1.4 E-06
Environmental sample archive building	2.7 E-03	2.7 E-05
Mobile laboratory storage facility	2.7 E-04	2.7 E-06
Contaminated liquid waste retention vault	2.7 E-03	2.7 E-05
Vented tankers	2.7 E-03	2.7 E-03

1
2
3
4
5

This page intentionally left blank.

As Low As Reasonably Achievable Control Technology Demonstration,
and Notice of Construction and Best Available Radionuclide Control
Technology Demonstration for Hanford Site Vented Containers
September 19, 1996

The following description and any attachments and references are provided to the Washington State Department of Health, Division of Radiation Protection, Air Emissions & Defense Section as a Notice of Construction (NOC) in accordance with the Washington Administrative Code (WAC) 246-247, Radiation Protection -- Air Emissions. The WAC 246-247-060, "Applications, registration and licensing," states "This section describes the information requirements for approval to construct, modify, and operate an emission unit. Any NOC requires the submittal of the information listed in Appendix A." Appendix A (WAC 246-247-010), lists the requirements that must be addressed.

1. Location: Hanford Site categorical vented container, Richland, Washington, 99352. Latitude 46° 22' 13.8", Longitude 119° 16' 12.3".
2. Responsible Manager: Mr. J. E. Rasmussen, Division Director Environmental Assurance, Permits, and Policy, U.S. Department of Energy, Richland Operations Office, P.O. Box 550, Richland, Washington, 99352.
3. Proposed Action: Establish a categorical Hanford Site "As Low As Reasonably Achievable Control Technology" (ALARACT) demonstration for existing vented containers, a categorical Hanford Site NOC and "Best Available Radionuclide Control Technology" (BARCT) demonstration for all future vented containers.
4. SEPA: SEPA not applicable.
5. Chemical and Physical Processes: Containers are used to store mixed and/or radioactive waste generated on and off the Hanford Site. Venting devices are installed when there is the potential for nonradioactive gases (i.e., hydrogen) to be generated as a result of radiolysis.
6. Proposed Controls: Venting devices, such as the NucFil™¹ filter, or an equivalent filter, prevent the release of any particulate matter. These devices are viewed as operating in continuous mode. The manufacturer requires that one hundred percent of the NucFil™ filters are tested to verify removal efficiency of greater than 99.97 percent of 0.3 µm dioctyl phthalate (DOP) particles and that each filter is therefore HEPA grade (DOE 1995b and WDOH 1995). It is proposed that the vent clip be accepted as ALARACT; when conditions require the waste be repackaged vent clips will be replaced by NucFil™ or equivalent filters.
7. Drawings of Controls: See attachment.

¹NucFil is a trademark of F.F.T., Incorporated, Golden, Colorado.

As Low As Reasonably Achievable Control Technology Demonstration,
and Notice of Construction and Best Available Radionuclide Control
Technology Demonstration for Hanford Site Vented Containers
continued,

8. Radionuclides of Concern: $^{239/240}\text{Pu}$ equivalent curies (PE-Ci) as discussed in the *Hanford Site Solid Waste Acceptance Criteria* (WHC 1994a).
9. Monitoring: Current and future monitoring of vented containers will remain equivalent to what is required by safety analysis and the associated Hanford Site practices and procedures. At a minimum radiological surveys of the storage areas will be performed once a year or radiological surveys of the containers will be performed prior to shipment and upon receipt at a storage location. Generally, radiological surveys involve the analysis of swipe and smear samples which are often analyzed in the field using portable instruments (e.g., Geiger-Mueller detectors, scintillation detectors, proportional detectors, and scalers). These detectors are calibrated on an annual basis. Readings must fall within 20 percent of the instrument calibration to be accepted. When readings fall outside the 20 percent allowance, the instrument is re-calibrated.
10. Annual Possession Quantity: The annual possession quantity for each vented container varies. The maximum quantity per container would be based on preventing nuclear criticality. Hanford Site manages nuclear criticality by 1) controlling the amount of fissionable material in each container; 2) container spacing requirements; and 3) container segregation.
11. Physical Form: Solids, and particulate solids.
12. Release Form: Solids, and particulate solids.
13. Release Rates: Vented containers are viewed as operating in continuous mode. The abated release rate estimate is based on the assumption that in 1995, all vented containers contributed one tenth of one percent of the diffuse and fugitive emissions as reported in the *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1995* (DOE 1995a). In 1995, the total number of vented containers at Hanford was approximately 3500 and the abated release from a single container is 5.1 E-9 mrem/yr . The estimated Potential-To-Emit (PTE) for each vented container is $1.5 \text{ E-5 mrem/year}$. The PTE was determined by performing the back-calculation method following the *Unit Dose Calculation Methods and Summary of Facility Effluent Monitoring Plan Determinations* (WHC 1991b).
14. Location of the MEI: 1.7 kilometers east across the Columbia River from the 300 Area: Latitude $46^\circ 22' 22.0''$; Longitude $119^\circ 15' 36.9''$.

As Low As Reasonably Achievable Control Technology Demonstration,
and Notice of Construction and Best Available Radionuclide Control
Technology Demonstration for Hanford Site Vented Containers
continued

15. TEDE to the MEI: The estimated unabated and abated TEDE per container is 1.5 E-5 and 5.1 E-9 mrem/yr, respectively. See attachment. [TEDE to MEI attributed to all diffuse and fugitive emissions from the Hanford Site was 1.8 E-2 mrem/yr for calendar year 1995, (DOE 1995a)].
16. Cost Factors if no Analysis: NucFil™ filters, or equivalent filter were approved as BARCT for vented containers (see DOE 1995b, WDOH 1995), thus no cost factors are provided.
17. Duration of Lifetime: It may be assumed that these containers will be available using limits established by the estimates in this NOC annually for as long as needed to support storage until final closure of Hanford Site.
18. Standards: Technology standards for the vented container filter emission units follow ASME NQA-1 procurement standards and a Filter Efficiency Test Procedure developed in 1985 (see Appendix C, DOE 1995b). This test procedure is approved by the Savannah River Site, Rocky Flats Plant, and Lawrence Livermore, among others, for the certification of the NucFil™ filters. No further standards are applicable for an insignificant emission unit.
19. Conditions/Clarification:
 - a. The Hanford Site categorical vented container Latitude and Longitude coordinates refer to the location resulting in the highest impact to the MEI. *MRC*
 - b. WDOH accepts the vent clip as ALARACT since they are no longer installed. *MRC*
 - c. The annual possession quantity for this categorical approval is accepted due to the variability of waste types. *MRC*
 - d. Containers other than drums are also approved if they meet the conditions of this NOC. *MRC*

APPROVALS

J. E. Rasmussen
J. E. Rasmussen,
Environmental Assurance, Permits & Policy

11/13/96
Date

A. W. Conklin
A. W. Conklin,
Washington State Department of Health

9/19/96
Date

BACKGROUND

Both the Washington State Department of Health (DOH) [under WAC 246-247] and the Environmental Protection Agency (EPA) Region 10 [under Title 40 Code of Federal Regulations (CFR) Part 61] have determined that vented drums are not "sealed sources," thus are regulated as sources of radioactive airborne emissions. The submission and approval of a Notice of Construction (NOC) and an Application for approval to construct are required, by DOH and EPA respectively, prior to the construction or modification of sources of radionuclide air emissions.

On May 31, 1995, DOH performed an unannounced inspection of the WHC operated Central Waste Complex (CWC). Subsequently, DOH issued the finding (Audit Number 41, DOH Letter Number AIR 95-601, dated June 5, 1995), "Failure to furnish an NOC for the Central Waste Complex (CWC) to DOH. The CWC stores passively vented and sealed drums. The storage of the passively vented drums required an NOC prior to building." The regulatory basis for this action was 40 Code of Federal Regulations 61 Subpart H Section 61.93, and WAC 246-247-010.

In September and October 1995 respectively, EPA and DOH approved the "Notice of Construction for the Modification of the Central Waste Complex (CWC) and Enhanced Radioactive and Mixed Waste Storage Phase V, Project W-112." Approval of this NOC established, for CWC, the ALARACT for the existing vented containers and "best available radionuclide control technology" (BARCT) for all future vented containers. This approval set a precedence for a site wide ALARACT and a site wide BARCT demonstration can only be achieved by the approval of a site wide NOC.

On October 31, 1995 United States Department of Energy, Richland Operations Office (RL) in the letter "Identification of Potential Non compliant conditions with the State of Washington Department of Health Radioactive Air Emissions Regulations (246-247 Washington Administrative Code) at the Hanford Site, Vented Containers was listed as the only crosscutting condition. The letter stated that:

- 1) "DOH would not seek formal enforcement action against RL for any existing violations of DOH radioactive air emissions regulations so long as notification of such non compliant condition was made to DOH on or before October 31, 1995."
- 2) existing vented containers required DOH approval of a technical standards equivalency demonstration to sanction the "as low as reasonably achievable control technology" (ALARACT), pursuant to WAC 246-247-040(4).

On July 22, 1996, DOH issued a letter formally documenting the request for a site wide vented container NOC. The intent of DOH, was to ensure that this activity would be permitted and included in the upcoming Radioactive Air Emissions License issued as a part of the Air Operating Permit. Technically, each drum or container represents a separate emission point and DOH recommended that a site wide categorical approval for these units would be an efficient means to satisfy the regulatory requirements.

RECOMMENDATIONS

To avoid enforcement actions it is recommended that this NOC be provided and approved by DOH. Completing this action will insure continuance of the valuable trust which has allowed the streamlined permitting of activities at Hanford.

Site wide approval of ALARACT and BARCT for all existing containers and future activities is a once and for all streamlining and cost savings for all applicable activities. Approval of this categorical NOC also establishes a precedent and foundation for future categorical permitting. The other generous concessions offered by DOH within this short form NOC provide flexibility and reduce the risk of compliance issues for future intended Hanford operations and final clean up activities.

ATTACHMENT

for

AS LOW AS REASONABLY ACHIEVABLE CONTROL TECHNOLOGY DEMONSTRATION,
AND NOTICE OF CONSTRUCTION AND BEST AVAILABLE RADIONUCLIDE CONTROL
TECHNOLOGY DEMONSTRATION FOR HANFORD SITE VENTED CONTAINERS

September 19, 1996

ANNUAL POSSESSION QUANTITY

The annual possession quantity would normally be adjusted by a release fraction of 0.001 for particulate material to determine the PTE Unit Vented Container (UVC). Thus, the estimated annual possession quantity would be 1,000 times the PTE.

- The radioisotopes of significance that influence the dose to the offsite maximally exposed individual (MEI) are ^{238}Pu and $^{239/240}\text{Pu}$ as discussed in the *Hanford Site Solid Waste Acceptance Criteria* (WHC 1994a).
- For example, the allowed CWC TRU content of waste containers is generally limited to 35 $^{239/240}\text{Pu}$ equivalent curies (PE-Ci), based on safety analysis.
- However, the annual possession quantity for each UVC is variable and a maximum value per container could be based on a safety analysis designed to prevent nuclear criticality.
- Nuclear criticality is prevented through strict control of the amount of fissionable material in each container, container segregation and spacing requirements.

05/2000

HANFORD SITE SOLID WASTE ACCEPTANCE CRITERIA RADIONUCLIDES COMMONLY CONVERTED TO FISSILE GRAM ^{239/240}Pu EQUIVALENT CURIES

⁶⁰Co,
⁸⁵Kr,
⁸⁹Sr, ⁹⁰Sr, ⁹⁰Y, ⁹¹Y,
⁹⁵Zr, ⁹⁵Nb,
⁹⁹Tc,
¹⁰³Ru, ¹⁰³Rh, ¹⁰⁶Ru, ¹⁰⁶Rh,
¹²⁵Sb, ¹²⁵Te, ¹²⁷Te, ^{127m}Te, ¹²⁹Te, ^{129m}Te,
¹²⁹I,
¹³⁴Cs, ¹³⁵Cs, ¹³⁷Cs, ¹³⁷Ba,
¹⁴¹Ce, ¹⁴⁴Ce, ¹⁴⁴Pr,
¹⁴⁷Pm, ¹⁴⁸Pm,
¹⁵²Eu, ¹⁵⁴Eu, ¹⁵⁵Eu,
²¹⁰Po,
²²⁸Th, ²³²Th, ²³⁴Th,
²³²U, ²³³U, ²³⁴U, ²³⁵U, ²³⁶U, ²³⁸U,
²³⁷Np,
²³⁸Pu, ²³⁹Pu, ²⁴⁰Pu, ²⁴¹Pu, ²⁴²Pu, ²⁴¹Am,
²⁴²Cm, ²⁴⁴Cm.

TO DETERMINE PE-CI CONTENT FOR A UVC

- The PE-Ci is derived by multiplying the isotopic composition (i.e., weight fractions of the various TRU isotopes) by the specific activities of each isotope, and then converting that number with correction factors taken from the *Hanford Site Solid Waste Acceptance Criteria* (WHC 1994a).
- The PE-Ci unit is designed to control inhalation dose impacts independent of radionuclide type. The radionuclides ²³⁹Pu and ²⁴⁰Pu are considered equivalent and are combined for calculation purposes.
- The physical and release forms to be addressed for BARCT/ALARACT, are solid particulate.

BACK CALCULATION OF THE ESTIMATED POTENTIAL-TO-EMIT

The proposed method determines the PTE for the UVC by performing a back-calculation using a portion of the emissions attributed to the Hanford Site diffuse and fugitive emissions to estimate the UVC emission rates and the control equipment efficiencies. This back-calculation method is performed in accordance with the methods of the Facility Effluent Monitoring Plan (FEMP) Determinations (WHC 1991b) for the Hanford Site.

DATA

The EDE to MEI attributed to diffuse and fugitive emissions was reported as 1.8 E-2 mrem/yr for Hanford Site calendar year 1995 emissions (DOE 1995a).

Figure 2 shows the location of the MEI, which is 1.7 kilometers east across the Columbia River from the 300 Area (Latitude 46° 22' 22.0": Longitude 119° 15' 36.9").

ASSUMPTIONS

- 1) Of the Hanford Site diffuse and fugitive emissions from calendar year 1995, it is proposed that one tenth of one percent be assumed as the contribution from all Hanford Site UVCs.
 - a) The diffuse and fugitive emissions value is primarily attributed to 12 general types of sites and facilities and 60 specific Source Areas listed.
 - b) This value includes all emissions from the passively ventilated single-shell tank farms.
 - c) It can be easily assumed that the passively ventilated SST farms contribute at least 1000 times the amount from all Hanford Site UVCs last year.
- 2) Even though different types and sizes of UVC exist on Hanford Site it is conservative to assume that the smaller containers contribute as much as the largest containers storing the maximum inventory safety will allow.
- 3) Estimated vented container count for 1995 is 3500.

ABATED EMISSIONS ATTRIBUTED TO DIFFUSE AND FUGITIVE EMISSIONS FROM CALENDAR YEAR 1995

ALL UVCs

Abated emission from all UVCs in 1995 is estimated by using assumptions 1 and 2:

$$1.8 \text{ E-2 mrem/yr} \times 0.001 = 1.8 \text{ E-5 mrem/yr}$$

EACH UVC

Abated emission for each UVCs in 1995 is estimated by using assumptions 1, 2, and 3:

$$1.8 \text{ E-5 mrem/yr} / 3500 = 5.1 \text{ E-9 mrem/yr}$$

UNABATED EMISSIONS ATTRIBUTED TO DIFFUSE AND FUGITIVE EMISSIONS FROM CALENDAR YEAR 1995

ALL UVCs

Unabated emission from all UVCs in 1995 is estimated by using assumptions 1 and 2, and the treatment factor of 3000 in accordance with FEMP:

$$1.8 \text{ E-5 mrem/yr} \times 3000 = 5.4 \text{ E-2 mrem/yr}$$

EACH UVC

Unabated PTE emission for each UVCs in 1995 is estimated by using assumptions 1, 2, and 3, and the treatment factor of 3000 in accordance with FEMP:

$$5.1 \text{ E-9 mrem/yr} \times 3000 = 1.5 \text{ E-5 mrem/yr}$$

MAXIMUM PROJECTED VENTED CONTAINER COUNT

- Approximately 10,000 UVC would be the Maximum projected Vented Container count based on the total unabated (i.e., PTE) emissions offering less than 0.1 mrem/yr TEDE to the MEI.
- Approximately 27,000,000 UVC would be the Maximum projected Vented Container count based on the total abated emissions offering less than 0.1 mrem/yr TEDE to the MEI.

Figure 2
Unit Vented Container (UVC) and Maximally Exposed Individual (MEI) Locations

REFERENCES

- DOE 1995a, *Radionuclide Air Emissions Report for the Hanford Site Calendar Year 1995*, DOE/RL-96-37, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE 1995b, *Radioactive Air Emissions Program Notice of Construction for the Central Waste Complex and Enhanced Radioactive and Mixed Waste Storage, Phase V, Project W-112*, DOE/RL-95-79, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- WDOH 1995, *Approval Letter for the Radioactive Air Emissions Program Notice of Construction for the Central Waste Complex and Enhanced Radioactive and Mixed Waste Storage, Phase V, Project W-112*, from A. W. Conklin (DOH), to J. E. Rasmussen (DOE/RL), Permit No. AIR 95-1009, dated October 25, 1995.
- WHC, 1994a, *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994b, *Central Waste Complex Criticality Prevention Specification*, CPS-SW-149-00002, Revision B-1, Westinghouse Hanford Company, Richland, Washington.
- WAC 246-247, 1994, "Radiation Protection--Air Emissions," *Washington Administrative Code*, as amended.
- WHC, 1991b, *Unit Dose Calculation Methods and Summary of Facility Effluent Monitoring Plan Determinations*, WHC-EP-0498, Westinghouse Hanford Company, Richland, Washington.

1
2
3
4
5

This page intentionally left blank.

DISTRIBUTION

J. Leitch
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

A. W. Conklin
Washington State Department of Health
7171 Cleanwater Lane, Building 5
Olympia, Washington 98504

R. S. Acselrod
Washington State Department of Health
PMB 385
2839 W. Kennewick Avenue
Kennewick, Washington 99336

J. W. Schmidt
Washington State Department of Health
PMB 385
2939 W. Kennewick Avenue
Kennewick, Washington 99336

Dirk A. Dunning
Oregon Office of Energy
625 Marrian Street N.E., Suite 1
Salem, Oregon 97301-3742

J. Wilkinson
Confederated Tribes of the Umatilla Indian Nation
P.O. Box 638
Pendleton, Oregon 97801

P. Sobotta
Nez Perce Tribe
P.O. Box 365
Lapwai, Idaho 93540

R. Jim, Manager
Environmental Restoration/Waste Management Program Yakama Nation
P.O. Box 151
Toppenish, Washington 98948

DISTRIBUTION (cont)

MSIN

U.S. Department of Energy, Richland Operations Office

E. M. Bowers	A2-15
P. K. Clark	A2-15
P. J. Krupin	A5-15
S. H. Wisness	A5-15
J. H. Zeisloft, Jr.	A2-15
Public Reading Room	H2-53

Fluor Hanford

J. A. Bates	G1-30
R. J. Boom	T6-14
L. E. Borneman	G1-27
R. H. Engelmann	G1-30
D. B. Hardy	S3-30
L. F. Perkins, Jr.	S3-03
D. L. Renberger	H6-10
J. C. Sonnichsen	G1-30
G. J. Warwick	S3-25
J. A. Winterhalder	T6-16
AOP Files	G1-29

Pacific Northwest National Laboratory

Hanford Technical Library	P8-55
---------------------------	-------

Lockheed Martin Services, Inc.

Central Files	B1-07
DPC	H6-08
EDMC (2)	H6-08