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UC-630

Radioactive Air Emissions Notice of Construction 340-A Building Tank Sludge Clean Out

Date Published
April 1997

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

Approved for Public Release

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A-6001-401R (07/94)

Department of Energy
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MAY 08 1997

97-EAP-407

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Air Emissions and Defense
Waste Section
Division of Radiation Protection
State of Washington
Department of Health
Airdustrial Park Building 5, LE-13
Olympia, Washington 98504-0095

Dear Messrs. Leitch and Conklin:

TRANSMITTAL OF RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) 340-A BUILDING TANK SLUDGE CLEAN OUT

Enclosed is the NOC for the removal of sludge from six storage tanks located inside the 340-A Building, which is located in the 300 Area of the Hanford Site. The NOC is being submitted pursuant to 40 Code of Federal Regulations (CFR) Part 61.96 and Washington Administrative Code (WAC) 246-247-060.

The proposed activity is categorized as a significant modification (>1.0 millirem per year) to an existing source under WAC 246-247. The proposed modification consists of removing sludge from the bottom of six storage tanks located in the 340-A Building. Sludge will be suspended using air sparging, water sluicing, and/or a circulation pump while simultaneously draining the tanks to the underground vault tanks located within the 340 Complex. Removing the sludge will reduce the radiological dose to 340-A Building personnel. A summary of the resulting offsite release and dose is provided as follows.

	Unabated release (curies/year)	Abated release (curies/year)	Unabated dose (millirem/year)	Abated dose (millirem/year)	Nearest receptor
340-NT-EX Stack	7.93 E-02	1.98 E-08	1.22	3.05 E-07	1,400 meters northeast

Commencement of this activity needs to start within a short time frame since higher ambient temperatures will prevent this activity from starting due to worker safety concerns. Therefore, this transmittal letter is intended to satisfy all the notifications of startup in accordance with requirements in 40 CFR 61.09 and that approval of the application to construct would also constitute U.S. Environmental Protection Agency (EPA) acceptance of the startup notifications.

Should you have any questions, please contact me or Hector M. Rodriguez, of my staff, on (509) 376-6421.

Sincerely,

James E. Rasmussen

James E. Rasmussen, Director
Environmental Assurance, Permits,
and Policy Division

EAP:HMR

Enclosure:
Radioactive NOC 340-A Building

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Subject: TRANSMITTAL OF RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) 340-A BUILDING TANK SLUDGE CLEAN OUT

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CONTENTS

APPENDICES

FIGURE

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into metric units

If you know	Multiply by	To get
Length		
inches	25.40	millimeters
inches	2.54	centimeters
feet	0.3048	meters
yards	0.914	meters
miles	1.609	kilometers
Area		
square inches	6.4516	square centimeters
square feet	0.092	square meters
square yards	0.836	square meters
square miles	2.59	square kilometers
acres	0.404	hectares
Mass (weight)		
ounces	28.35	grams
pounds	0.453	kilograms
short ton	0.907	metric ton
Volume		
fluid ounces	29.57	milliliters
quarts	0.95	liters
gallons	3.79	liters
cubic feet	0.03	cubic meters
cubic yards	0.76	cubic meters
Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius

Out of metric units

If you know	Multiply by	To get
Length		
millimeters	0.0393	inches
centimeters	0.393	inches
meters	3.2808	feet
meters	1.09	yards
kilometers	0.62	miles
Area		
square centimeters	0.155	square inches
square meters	10.7639	square feet
square meters	1.20	square yards
square kilometers	0.39	square miles
hectares	2.471	acres
Mass (weight)		
grams	0.0352	ounces
kilograms	2.2046	pounds
metric ton	1.10	short ton
Volume		
milliliters	0.03	fluid ounces
liters	1.057	quarts
liters	0.26	gallons
cubic meters	35.3147	cubic feet
cubic meters	1.308	cubic yards
Temperature		
Celsius	multiply by 9/5ths, then add 32	Fahrenheit

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

RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION 340-A BUILDING TANK SLUDGE CLEAN OUT

1.0 INTRODUCTION

This document serves as a notice of construction pursuant to the requirements of Washington Administrative Code (WAC) 246-247-060 and as a request for approval to construct pursuant to 40 Code of Federal Regulations (CFR) 61.96 for the removal of sludge from six storage tanks located inside the 340-A Building, which is located in the 300 Area of the Hanford Site.

2.0 FACILITY LOCATION (Requirement 1)

The 340-A Building is located within the 300 Area of the Hanford Site (Figure 1). The geodetic coordinates for the 340-A Building are N54475 E15475.

3.0 RESPONSIBLE MANAGER (Requirement 2)

The responsible manager's name and address are as follows:

Mr. T. K. Teynor, Director
Waste Programs Division
U.S. Department of Energy,
Richland Operations Office
P.O. Box 550
Richland, Washington 99352
(509) 376-1366

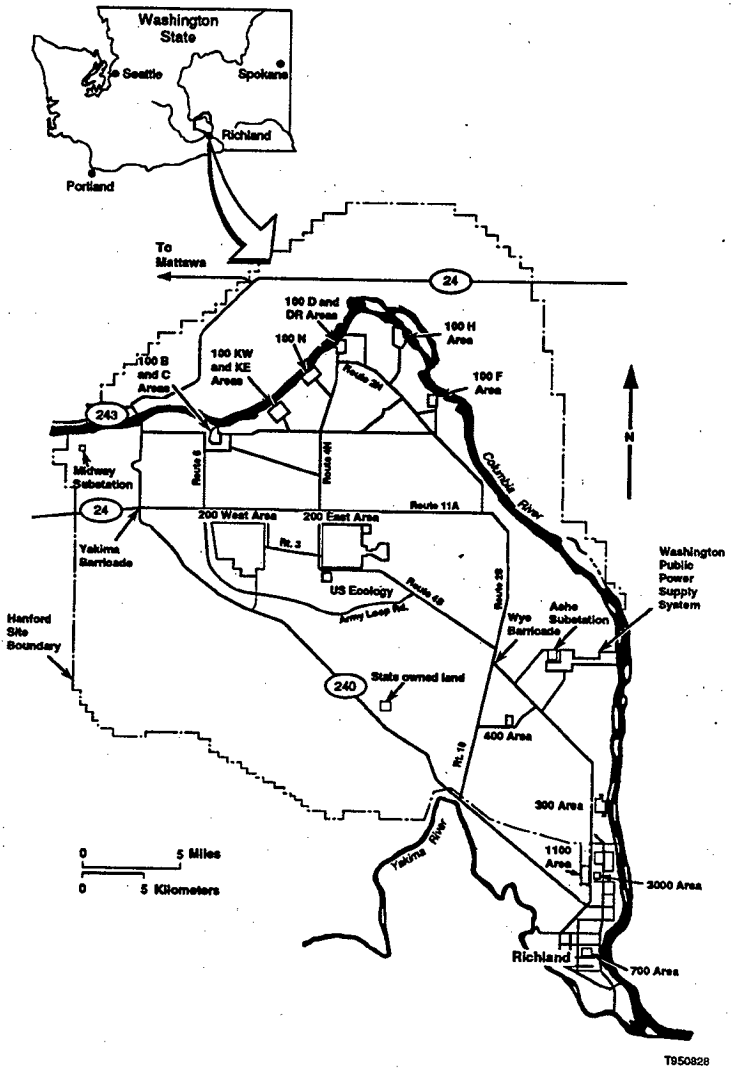

Figure 1. Hanford Site.

4.0 TYPE OF PROPOSED ACTION (Requirement 3)

The proposed activity is categorized as a significant modification (>1.0 millirem per year) to an existing source under WAC 246-247. The proposed modification consists of removing sludge from the bottom of six storage tanks located in the 340-A Building. Sludge will be suspended using air sparging, water sluicing, and/or a circulation pump while simultaneously draining the tanks to the underground vault tanks located within the 340 Complex. Removing the sludge will reduce the radiological dose to 340-A Building personnel.

The most recent tank solids removal effort occurred in the early 1980s. Future solids removal campaigns will be performed as needed to support as low as reasonably achievable (ALARA) practices/principles. There could be several years between campaigns. It should be noted that submittal of this document also is intended to satisfy WAC 246-247 notice of construction and 40 CFR 61 application for approval of construction or modification requirements for all future tank sludge removal campaigns at the 340-A Building if the following conditions are met.

- Potential emissions will not exceed the levels provided in Appendix A.
- There will be no potential emissions of radionuclides that are not identified in Appendix A.
- No more than one tank solids removal campaign will be performed during any annual period. (A campaign consists of the removal of all sludge in the subject tanks.)
- The pollution control measures stated in this document have been implemented.

5.0 STATE ENVIRONMENTAL POLICY ACT (Requirement 4)

This activity is categorically exempt.

6.0 PROCESS DESCRIPTION (Requirements 5 and 7)

The 340 Complex is a less-than-90-day tank accumulation unit (according to the *Resource Conservation and Recovery Act of 1976*) for mixed waste from various buildings within the 300 Area. Included as part of the 340 Complex is the 340-A Building, which contains six 30,000-liter stainless steel tanks. These tanks provide reserve storage capacity for liquid mixed waste in the event there is a major upset in one of the facilities transferring waste to the 340 Complex, or if the 340 vault tanks fail.

The 340-A Building tanks are not equipped with agitation devices and/or equipment. Consequently, past usage of the tanks has resulted in the settling of waste solids (sludge). Inserting the agitation devices (e.g., air sparging, water sluicing, and/or a circulation pump) into the tanks will be accomplished through an opening on the top of each tank. To reduce the potential for airborne contamination, the tanks will be maintained at a negative pressure differential with respect to atmospheric pressure. The six tanks contain an average depth of 3.8 centimeters of sludge for a total volume of 1.67 cubic meters.

7.0 ANNUAL POSSESSION QUANTITY AND PHYSICAL FORM

(Requirements 8, 10, 11, and 12)

The source term for the six tanks is based on the quantity of sludge and the analytical results obtained from sludge samples. All isotopes are expected to be in particulate form. Source term data have been provided in Appendix A.

8.0 CONTROL SYSTEM (Requirement 6)

The 340-NT-EX Stack is registered with Washington State Department of Health (WDOH) as a pre-existing (before August 10, 1988) actively ventilated stack. As shown in Appendix B, the ventilation system contains three parallel filter trains consisting of a prefilter, two high-efficiency particulate air filters, and an activated charcoal filter. All three filter trains are used during normal ventilation system operation. The activated charcoal filters are pre-existing equipment and are not maintained; therefore, no credit is taken for the removal of radionuclides by the activated charcoal filters. The two high-efficiency particulate air filters are tested annually and each has a minimum efficiency of 99.95 percent for a particle size of 0.3 micron.

The existing control system is proposed as best available radionuclide control technology (BARCT) for the proposed tank cleanout activities in the 340-A Building (Appendix C).

9.0 MONITORING SYSTEM (Requirement 9)

The 340-NT-EX Stack has been designated a major stack and is in compliance with the standards required under 40 CFR 61, Subpart H. The stack contains a continuous monitoring system with a calibrated isokinetic sampling system. The sampling system meets the ANSI N13.1 standard. The monitoring system consists of a record sampler and Versapore 3000® filter paper or equivalent for particulates.

® Gelman Sciences Inc., Ann Arbor, MI.

10.0 RELEASE RATES (Requirement 13)

This section contains information and calculations regarding unabated and abated release rates associated with sludge removal from the six 340-A tanks. The potential to emit was calculated based on the volume and isotopic analysis of the sludge. An efficiency of 99.95 percent was assigned for each testable stage of the in-line high-efficiency particulate air filter for estimating the abated offsite release. No credit was taken for the prefilter or the activated carbon filter.

A release factor of 10^{-3} was used for the particulates. The estimated unabated and abated releases are presented in Appendix A.

11.0 OFFSITE IMPACT (Requirements 14 and 15)

This section contains information regarding the effective dose equivalents to the theoretical maximum exposed offsite receptor from unabated and abated emissions from the proposed activity.

Appendix A contains the information used to calculate the unabated and abated dose increases from the 340-NT-EX Stack from removing the sludge. Unit dose factors used in Appendix A were derived using CAP88 (WHC 1991). A summary of the resulting offsite release and dose is provided as follows.

	Unabated release (curies/year)	Abated release (curies/year)	Unabated dose (millirem/year)	Abated dose (millirem/year)	Nearest receptor
340-NT-EX Stack	7.93 E-02	1.98 E-08	1.22	3.05 E-07	1,400 meters northeast

The unabated dose from the 340-NT-EX Stack for routine operations within the 340 Complex is estimated at 167 millirems per year (WHC 1995). The abated dose for calendar year 1995 operations within the 340 Complex was 5.5 E-06 millirem per year (DOE/RL-96-37). The dose resulting from all Hanford Site operations in 1995 was determined to be 2.9 E-03 millirems per year for an individual located at the Sagemore Farm (1,500 meters east of the 300 Area), excluding radon (DOE/RL-96-37). The calculated abated offsite dose increase originating from the 340-NT-EX Stack is estimated to be 3.05 E-07 millirems per year. Cleaning out the six tanks in the 340-A Building, in conjunction with other current operations on the Hanford Site, is within the National Emission Standard of 10 millirems per year.

12.0 FACILITY LIFETIME (Requirement 17)

The 340-A Building is expected to continue receiving radioactive waste water through September 1998.

13.0 TECHNOLOGY STANDARDS (Requirement 18)

Two testable high-efficiency particulate air filters are used in series on the ventilation system to control particulate emissions resulting from transfer operations. The ventilation system is equivalent to the codes and standards contained in WAC 246-247-110(18). The 340-NT-EX HEPA filters equivalency demonstration for compliance with the ANSI/ASME N-509 and N-510 standards was approved by WDOH on March 13, 1997 (RFSH 1997) in accordance with WAC 246-247. The 340 Complex is not expected to receive any radioactive waste water after September 1998. In the event that a decision is made to use the 340 Complex for accepting radioactive waste water after September 1998, a schedule will be negotiated with WDOH for upgrading the ventilation system to meet ASME/ANSI N509 and N510 standards.

14.0 REFERENCES

ANSI, 1994, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities* N13.1, American National Standards Institute.

ASME/ANSI, 1989, *Nuclear Power Plant Air-Cleaning Units and Components*, N509, American Society of Mechanical Engineers, American National Standards Institute.

ASME/ANSI, 1989, *Nuclear Power Plant Air-Cleaning Units and Components*, N510, American Society of Mechanical Engineers, American National Standards Institute.

DOE/RL-95-07, "Hanford Site Air Operating Permit Application," May 1995, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-96-37, "Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 1995," June 1996, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1995, Letter, "Identification of Potential Noncompliant Conditions with State of Washington Department of Health (DOH) Radioactive Air Emissions Regulations (246-247 Washington Administrative Code) at the Hanford Site," J. E. Rasmussen, RL, to A. W. Conklin, WDOH, October 31, 1995.

RFSH, 1997, Telephone Conference Memorandum, "340-NT-EX Stack Filters ANSI/ASME N509 & N510 Substantive Requirements Demonstration," between R. S. Acselrod, WDOH, and J. S. Hill, RFSH, March 13, 1997.

WDOH, 1992, Letter, Air 92-107, A. W. Conklin, WDOH, to J. D. Bauer, RL, no subject, October 5, 1992.

WHC, 1991, "Unit Dose Calculation Methods and Summary of Facility Effluent Monitoring Plan Determinations," Westinghouse Hanford Company, Richland, Washington.

WHC, 1995, "Hanford Site Radionuclide National Emission Standards for Hazardous Air Pollutants Registered and Unregistered Stack (Powered Exhaust) Source Assessment", Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

DOSE CALCULATIONS

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340-A BUILDING ESTIMATED RADIOLOGICAL EMISSIONS ESTIMATE							
NUMBER OF TANKS	6						
AVERAGE SLUDGE DEPTH	1.5	INCHES					
TANK DIAMETER	10	FEET					
TOTAL WET SLUDGE VOLUME	58.90	CUBIC FEET					
TOTAL WET SLUDGE VOLUME	1.67E+06	MILLILITERS					
WET SLUDGE DENSITY	1.048	GRAM/MILLILITER					
TOTAL WET SLUDGE MASS	1.75E+06	GRAM					
RELEASE FRACTION	1.00E-03						
NUMBER OF HEPA FILTERS IN SERIES	2						
HEPA FILTER EFFICIENCY	99.95%						
ISOTOPE	CONCENTRATION MICROCURIES/GRAM	TOTAL CURIES	TOTAL UNABATED RELEASE, CURIES	TOTAL ABATED RELEASE, CURIES	CAP-88 DOSE FACTOR MREM/CURIE	TOTAL UNABATED OFFSITE DOSE MREM	TOTAL ABATED OFFSITE DOSE MREM
Sr-90 (Total Beta)	2.42E+01	4.23E+01	4.23E-02	1.06E-08	8.72E-01	3.69E-02	9.22E-09
U-234	8.13E-04	1.42E-03	1.42E-06	3.55E-13	6.36E+01	9.03E-05	2.26E-11
U-235	2.65E-05	4.63E-05	4.63E-08	1.16E-14	5.90E+01	2.73E-06	6.82E-13
U-236	7.18E-05	1.26E-04	1.26E-07	3.14E-14	6.01E+01	7.54E-06	1.89E-12
U-238	4.94E-04	8.63E-04	8.63E-07	2.16E-13	5.66E+01	4.89E-05	1.22E-11
Pu-238	6.70E-01	1.17E+00	1.17E-03	2.93E-10	1.60E+02	1.87E-01	4.68E-08
Pu-239	3.20E-01	5.59E-01	5.59E-04	1.40E-10	1.73E+02	9.68E-02	2.42E-08
Pu-240	3.00E-01	5.24E-01	5.24E-04	1.31E-10	1.73E+02	9.07E-02	2.27E-08
Pu-241	1.83E+01	3.20E+01	3.20E-02	8.00E-09	2.74E+00	8.77E-02	2.19E-08
Pu-242	6.30E-04	1.10E-03	1.10E-06	2.75E-13	1.73E+02	1.91E-04	4.76E-11
Am-241	1.58E+00	2.75E+00	2.75E-03	6.88E-10	2.62E+02	7.21E-01	1.80E-07
TOTAL	4.54E+01	7.93E+01	7.93E-02	1.98E-08		1.221	3.05E-07

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APPENDIX B

VENTILATION SYSTEM DRAWING

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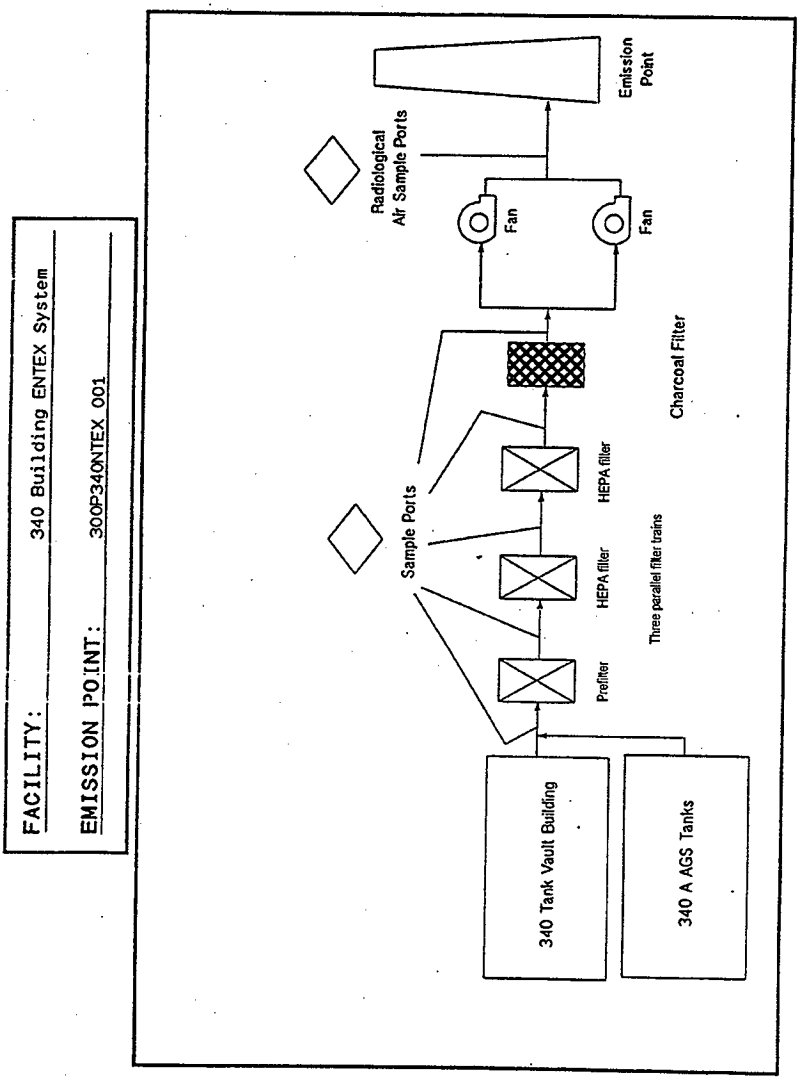
FACILITY: 340 Building ENTEX System
EMISSION POINT: 300P340NTEX 001
340 Tank Vault Building
340 A AGS Tanks
Prefilter
HEPA filter
HEPA filter
Three parallel filter trains
Sample Ports
Charcoal Filter
Fan
Fan
Radiological Air Sample Ports
Emission Point

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APPENDIX C

DISCUSSION OF BEST AVAILABLE RADIONUCLIDE CONTROL TECHNOLOGY

(Requirement 16)

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DISCUSSION OF BEST AVAILABLE RADIONUCLIDE CONTROL TECHNOLOGY

(Requirement 16)

Requirement 16 of WAC 246-247-060 is not applicable because best available radionuclide control technology (BARCT) emission equipment will be used. The BARCT is defined by WAC 246-247-030 as follows:

> "Technology that will result in a radionuclide emission limitation based on the maximum degree of reduction for radionuclides from any proposed newly constructed or significantly modified emission units that the licensing authority determines is achievable on a case-by-case basis. A BARCT compliance demonstration must consider energy, environmental, and economic impacts, and other costs through examination of production processes, and available methods, systems and techniques for control of radionuclide emissions. A BARCT compliance demonstration is the conclusion of an evaluative process that results in the selection of the most effective control technology from all known feasible alternatives. In no event shall application of BARCT result in emissions of radionuclides that could exceed the applicable standards of WAC 246-247-040. Control technology that meets BARCT requirements also meets ALARCT requirements."

As stated in WAC 246-247-120, only those radionuclides comprising more than 10 percent of the unabated dose need to be evaluated. The total dose is due to particulate radionuclides. The WDOH has provided guidance that high-efficiency particulate air filters generally are considered BARCT for particulate emissions (WDOH 1992).

It is proposed, pursuant to the citation above, that the heating, ventilation, and air conditioning systems (described in Section 8.0) and the controls (engineering and administrative) (described in Section 9.0) be approved as BARCT for the proposed tank cleanout activities in the 340-A Building.

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Division of Radiation Protection
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Olympia, Washington 98504-7827

Mr. Jerry Leitch, Chief
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L. W. Roberts	L6-04
R. W. Szelmeczka	L6-05
Air Operating Permit File	H6-25