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Department of Energy

Richland Operations Office
P.O. Box 550
Richland, Washington 99352

94-PCA-002

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Mr. A. W. Conklin, Head
Air Emissions and
Defense Waste Section
State of Washington
Department of Health
Airdustrial Park Building 5, LE-13
Olympia, Washington 98504-0095

Mr. J. McCormick, Director
Air and Toxics Division
U.S. Environmental Protection Agency
Region 10
Mail Stop AT-082
1200 Sixth Avenue
Seattle, Washington 98101

Dear Messrs. Conklin and McCormick:

NOTICE OF CONSTRUCTION FOR ORGANIC REMOVAL FROM TANK 241-C-103

Enclosed is a document that serves as a Notice of Construction (NOC) and an Application for Approval to Construct for Organic Removal from Tank 241-C-103. The document is provided pursuant to Washington Administrative Code 246-247 and 40 Code of Federal Regulations 61 Subpart H. All information requested in the two regulations is contained in the document.

This activity was discussed with Mr. A. W. Conklin, of the State of Washington Department of Health, during the April 1994, routine technical meeting and he requested the submittal of a written NOC. Unabated emissions from this passively ventilated activity result in an offsite dose less than 0.000019 millirem per year to the maximally exposed individual.

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Should you have any questions, please contact me or Mr. S. D. Stites of my staff on (509) 376-8566.

Sincerely,

James E. Rasmussen

James E. Rasmussen, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy

EAP:SDS

Enclosure:
Response to Comments

cc w/encl:
Administrative Record
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D. Powaukee, NPT

cc w/o encl:
W. Dixon, WHC
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RADIOACTIVE AIR EMISSIONS
NOTICE OF CONSTRUCTION
ORGANIC REMOVAL FROM TANK 241-C-103

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**Cross Reference Between
Notice of Construction
and Appendix A of
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1.0 Introduction

The proposed activity includes removal, separation, and storage of a floating layer of organic waste, approximately 19 cubic meters (5,000 gallons), found in Hanford Single-Shell Tank (SST) 241-C-103.

1.1 Notification Requirement and Guidance

This document serves as a Notice of Construction pursuant to Washington Administrative Code 246-247-060 for the Organic Removal from Tank 241-C-103. This document also serves as an application for approval to construct pursuant to 40 Code of Federal Regulations 61 for this activity.

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1.2 Facility Identification

U.S. Department of Energy, Richland Operations Office
Hanford Site
200 East Area, 241-C Tank Farm
Richland, Washington 99352

The Organic Removal from Tank 241-C-103 activities will occur in and around the 241-C Tank Farm.

Responsible Manager:
Mr. J. E. Rasmussen, Acting Program Manager
Office of Environmental Assurance,
Policy, and Permits
U.S. Department of Energy, Richland Operations Office
P.O. Box 550
Richland, Washington 99352

1.3 Type of Proposed Action

The proposed action is the modification of an existing, unregistered emission unit. All portions of the activity will take place in areas that are not actively ventilated (i.e., all potential emissions will occur through breather filters).

1.4 State Environmental Policy Act (SEPA) Environmental Checklist

The Organic Removal from Tank 241-C-103 is categorically exempt from the SEPA Process.

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2.0 Source Information

This section provides detailed information regarding the source and quantity of airborne radionuclide emissions resulting from the Organic Removal from Tank 241-C-103.

2.1 Process Description

The process to remove organic waste from Tank 241-C-103 can be broken into three functions: removal, aqueous/organic separation, and storage. Removal constitutes the removal of the organic waste layer from the tank and its transfer to downstream functions. Separation addresses the task of separating the organic and residual aqueous liquid carried with the organic waste layer. Storage addresses the need to safely contain and store the organic waste layer prior to disposal.

Removal - The organic waste layer will be removed from Tank 241-C-103 by the use of a floating head weir and will be pumped from Tank 241-C-103 into a separations enclosure, above grade.

Organic/Aqueous Separation - Separation of the mixed product stream will be performed by a passive system, either a gravity separator or coalescer. Separation will be performed in a separations enclosure prior to transfer to the tank trailer. The separated aqueous stream will be returned directly to the tank's aqueous waste layer without treatment. The separations module will be vented back to a common vent header on Tank 241-C-103.

Storage - The current plan is to provide storage for approximately 19 cubic meters (5,000 gallons) of organic waste in a tanker truck in close proximity to Tank 241-C-103. The organic waste layer will remain in storage until a disposal strategy is finalized. The storage unit will be vented back to a common vent header on Tank 241-C-103 during filling. After filling, for longer storage, the tanker may be moved to the 241-B Tank Farm and will have a separate breather filter.

2.2 Facility Inventory

The portion of the inventory of Tank 241-C-103 that will be affected by this project consists of approximately 19 cubic meters (5,000 gallons) of organic waste and three cubic meters (800 gallons) of aqueous waste. The following table presents the composition of each type of waste and the total quantity of each nuclide included in the affected inventory, derived from tank samples (Pool and Bean 1994).

Table 1: Waste Composition and Annual Possession Quantity

	Waste Composition				Annual Possession Quantity		
	Aqueous		Organic		Aqueous	Organic	Total
		Unit		Unit	Ci	Ci	Ci
Density	1.08E+00	g/mL	8.76E-01	g/mL			
Co-60	4.74E-02	µCi/g	7.45E-04	µCi/g	1.55E-01	1.24E-02	1.67E-01
Sr-90			5.50E-01	µCi/g		9.12E+00	9.12E+00
Cs-137	5.37E+01	µCi/g	4.13E-02	µCi/g	1.76E+02	6.85E-01	1.76E+02
Ba-137m	5.37E+00	µCi/g	4.13E-03	µCi/g	1.76E+01	6.85E-02	1.76E+01
Eu-154			3.17E-04	µCi/g		5.26E-03	5.26E-03
Eu-155			3.15E-04	µCi/g		5.22E-03	5.22E-03
Am-241			1.79E-04	µCi/g		2.97E-03	2.97E-03
Pu-238			9.02E-05	µCi/g		1.50E-03	1.50E-03
Pu-239/240			1.94E-04	µCi/g		3.22E-03	3.22E-03

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3.0 Unabated Release Rates

This section provides information regarding the emission release rates from the Organic Removal from Tank 241-C-103 without the emission control system in place. Also included is the effective dose equivalent (EDE) to the maximally exposed individual (MEI) offsite resulting from unabated emissions.

3.1 Unabated Emissions

Air emissions may be generated in several aspects of the activity. These potential emissions are derived from nominal operation of Tank 241-C-103, separation of the organic layer from the tank, potential leakage within the separation enclosure, and storage of the organic liquids within the tank trailer. Both the separation enclosure and tank trailer will be vented, for gaseous displacement and breathing considerations, back to the common vent header existent on Tank 241-C-103.

Following the discussion of each source of air emissions, two tables summarize the volumetric flow and unabated emissions from the activities.

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Tank 241-C-103 Emission Source:

Tank 241-C-103 is not actively ventilated. Emissions from the tank are produced by both breathing of the tank and displacement caused by instrumentation purge air additions.

Recent analyses (Crippen 1993) of Hanford Site barometric data have yielded breathing losses from vessels on the Hanford Site as 1.69 times the volume of headspace per year. For Tank 241-C-103 volume of 2,000 cubic meters (530,000 gallons) and current waste content (Hanlon 1994) of 535 cubic meters (195,000 gallons), such breathing losses will be 2,143 m^3/yr.

Normal operation of Tank 241-C-103 includes the operation of a liquid level tape. This instrumentation is continuously purged with process air at a rate of 12,403 cubic meters per year (m^3/yr) [50 cubic feet per hour (ft^3/hr)]. This purge gas displaces air in the tank headspace.

These displacements and breathing rates are not effected by this action.

Recent safety analyses of this tank (Postma 1994) have shown particulate concentrations in the headspace of the tank to be 0.043 grams per cubic meter (g/m^3). The composition of this particulate dispersion is that of the organic phase of the waste (Pool and Bean 1994).

Separations Enclosure Emission Source:

Housed within the enclosure are to be the various components required for the separation of the organic and aqueous layers. These components are to be sealed units. However, the existence of valves within the enclosure yields the potential of a leak from the fluid system. The fluid system is to be operated at low pressure, hence leaks from this system are postulated to yield worst case air concentrations of particulate matter equal to those of the SST at 0.043 g/m^3. The composition of this particulate dispersion, in a worst case analysis (radionuclide contamination), is that of the aqueous phase of the waste (Pool and Bean 1994). Although Table 1 includes more radionuclides in the organic phase, the aqueous phase has a concentration of cesium that precludes providing good estimates of the other radionuclides. Due to this high concentration of cesium, the concentration of the other radionuclides is negligible.

The separations enclosure is to have a volume of not greater than 4.25 m^3 (150 ft^3). The enclosure will not be actively ventilated. The enclosure is expected to operate for a total of not greater than three months, yielding breathing losses of 1.8 m^3.

Tank trailer Emission Source:

A tank trailer is expected to receive the organic liquid separated in the separations enclosure. Gaseous displacement, upon fill, is expected to be 19 cubic meters (5,000 gallons). Breathing losses are estimated as breathing of the full volume for the duration of the fill (three months) and breathing of 20 percent of the volume [four cubic meters (1,000 gallons)] for the balance of the year for a total of 12.8 m^3/yr.

Although the gas and liquid temperature within the trailer are expected to equilibrate with the environment (annual average ~58°F), emissions are estimated based upon tank headspace temperatures (~104°F) and concentrations for conservatism. Particulate emissions are estimated in the same fashion as described for the tank and separation enclosure.

Displacement and ventilation emissions from all activities are summarized in the following table.

Table 2: Displacement and Ventilation Rates

	Breathing m^3/yr	Displacement m^3/yr	Total m^3/yr
Tank C-103	2143.1	(Purge Air) 12402.8	14545.9
Enclosure	1.8		1.8
Tank Trailer	12.8	18.9	31.7
Total			14579.4

Determined based on the displacement and ventilation rates as well as the waste composition and aerosol concentration of 0.043 g/m^3, the unabated emissions are shown in the following table. All emissions are particulate or dispersed liquids (aerosols).

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Table 3: Unabated Emissions

	Aerosol Concentration		Breathing and Displacement Emissions		
	Aqueous	Organic	Aqueous	Organic	
	Ci/m^3	Ci/m^3	Separations Enclosure	Tank Trailer	241-C-103
			Ci/yr	Ci/yr	Ci/yr
Co-60	2.04E-09	3.20E-11	3.67E-09	1.02E-09	4.66E-07
Sr-90		2.36E-08		7.50E-07	3.44E-04
Cs-137	2.31E-06	1.78E-09	4.16E-06	5.63E-08	2.58E-05
Ba-137m	2.31E-07	1.78E-10	4.16E-07	5.63E-09	2.58E-06
Eu-154		1.36E-11		4.32E-10	1.98E-07
Eu-155		1.35E-11		4.29E-10	1.97E-07
Am-241		7.70E-12		2.44E-10	1.12E-07
Pu-238		3.88E-12		1.23E-10	5.64E-08
Pu-239/240		8.34E-12		2.64E-10	1.21E-07

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3.2 Unabated Dose

The unabated dose to the MEI located 16 kilometers east of the 241-C Tank Farm is shown in Table 4. The dose factors for Europium (Eu-154 and Eu-155) are for releases from the 300 Area. Europium releases were not modeled from the 200 Area, however, releases from the 300 Area represent a conservative dose. The unit dose factors included in the table were previously submitted to the State of Washington Department of Health (DOH). The information required to develop the unit dose factors from the Clean Air Assessment Package 1988 computer code was also included in "Unit Dose Calculation Methods Summary of Facility Effluent Monitoring Plan Determinations" (WHC 1991).

Table 4: Unabated Dose

	Unit Dose Factor	Unabated Emissions	Unabated Dose
	mrem/Ci	Ci/yr	mrem/yr
Co-60	2.90E-02	4.71E-07	1.36E-08
Sr-90	4.38E-02	3.45E-04	1.51E-05
Cs-137	2.39E-02	3.00E-05	7.18E-07
Ba-137m		3.00E-06	0.00E+00
Eu-154*	3.64E-01	1.99E-07	7.23E-08
Eu-155*	3.68E-02	1.97E-07	7.27E-09
Am-241	1.31E+01	1.12E-07	1.47E-06
Pu-238	8.02E+00	5.65E-08	4.53E-07
Pu-239/240	8.67E+00	1.22E-07	1.05E-06
Total Dose			1.89E-05

Note: Unit dose factors for Eu-154 and Eu-155 are provided for releases from the 300 Area. They are not included in the unit dose document for releases from the 200 Area and using the factor for the 300 Area is conservative.

4.0 Control and Monitoring Systems

This section contains information on both the emission control systems and the monitoring systems proposed for Organic Removal from Tank 241-C-103.

4.1 Control System

Both the separation enclosure and tank trailer will be vented, for gaseous displacement and breathing considerations, back to the common vent header existent on Tank 241-C-103. The vent header on Tank 241-C-103 is equipped with a High Efficiency Particulate Air (HEPA) Filter with a particulate matter efficiency of not less than 99.93 percent for particles greater than 0.3 microns. All emission will occur through this breather filter and will be abated at 99.93 percent. Although HEPA filters are required to be 99.95 percent efficient, 99.93 percent is used for conservatism, to account for the fact that the HEPA filter is used in a passive system.

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4.2 Monitoring System

No part of the activity of removing, separating, and storing the organic waste from Tank 241-C-103 will be ventilated through an active system. All sampling systems require active (powered) ventilation to operate correctly. Health physics technicians will be present during operation of the system to verify that emissions are as low as reasonably achievable.

5.0 Abated Release Rates

This section provides information regarding the abated emission release rates from the Organic Removal from Tank 241-C-103. Also included is the EDE to the MEI offsite resulting from abated emissions.

5.1 Abated Emissions

Based upon unabated emissions presented in Section 3.1 and the HEPA efficiency of 99.93 percent for abatement, abated emissions are presented in Table 5.

Table 5: Abated Emissions

	Unabated Emissions	Control Efficiency	Abated Emissions
	Ci/yr	Percent	Ci/yr
Co-60	4.71E-07	99.93	3.29E-10
Sr-90	3.45E-04	99.93	2.41E-07
Cs-137	3.00E-05	99.93	2.10E-08
Ba-137m	3.00E-06	99.93	2.10E-09
Eu-154	1.99E-07	99.93	1.39E-10
Eu-155	1.97E-07	99.93	1.38E-10
Am-241	1.12E-07	99.93	7.85E-11
Pu-238	5.65E-08	99.93	3.96E-11
Pu-239/240	1.22E-07	99.93	8.51E-11

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5.2 Abated Dose

The abated dose to the MEI located 16 kilometers east is shown in Table 6. The unit dose factors included in the table are described in Section 3.2.

Table 6: Abated Dose

	Unit Dose Factor	Abated Emissions	Abated Dose
	mrem/Ci	Ci/yr	mrem/yr
Co-60	2.90E-02	3.29E-10	9.55E-12
Sr-90	4.38E-02	2.41E-07	1.06E-08
Cs-137	2.39E-02	2.10E-08	5.03E-10
Ba-137m		2.10E-09	
Eu-154*	3.64E-01	1.39E-10	5.06E-11
Eu-155*	3.68E-02	1.38E-10	5.09E-12
Am-241	1.31E+01	7.85E-11	1.03E-09
Pu-238	8.02E+00	3.96E-11	3.17E-10
Pu-239/240	8.67E+00	8.51E-11	7.38E-10
			1.32E-08

Note: Unit dose factors for Eu-154 and Eu-155 are provided for releases from the 300 Area. They are not included in the unit dose document for releases from the 200 Area and using the factor for the 300 Area is conservative.

The dose resulting from all Hanford Site operations in 1992 was determined to be 0.004 millirem per year (mrem/yr) for an individual located at Ringold (PNL 1993). The emissions as a result of the Organic Removal from Tank 241-C-103 in conjunction with other operations at the Hanford Site will not result in a violation of the National Emission Standard of ten mrem/yr.

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6.0 References

Crippen, M. D., 1993, *Barometric Pressure Variations*, WHC-EP-0651, Westinghouse Hanford Company, Richland, Washington.

Hanlon, B. M., 1994, *Tank Farm Surveillance and Waste Status Summary Report for December 1993*, WHC-EP-0182-69, Westinghouse Hanford Company, Richland Washington.

Pool, K. H. and R. M. Bean, 1994, *Waste Tank Organic Safety Project, Analysis of Liquid Samples from Hanford Waste Tank 241-C-103*, PNL-9403, Pacific Northwest Laboratory, Richland, Washington.

Postma, A. K., 1994, *Safety Analysis of Exothermic Reaction Hazards Associated with the Organic Liquid Layer in Tank 241-C-103*, WHC-SD-WM-SARR-001, Westinghouse Hanford Company, Richland, Washington.

PNL 1993, *Hanford Site Environmental Report for Calendar Year 1992*, June 1993, PNL-8682, UC-602, Pacific Northwest Laboratory, Richland, Washington.

WHC 1991, *Unit Dose Calculation Methods Summary of Facility Effluent Monitoring Plan Determinations*, November 1991, WHC-EP-0498, Westinghouse Hanford Company, Richland Washington.

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Appendix A - Best Available Radionuclide Control Technology (BARCT) Discussion

The use of HEPA filtration on the passive ventilation used for this activity is proposed as BARCT. DOH has previously provided guidance that HEPA Filters are generally considered BARCT for particulate emission and radionuclide emissions from this activity are limited to particulates. Additionally, barring the addition of an active ventilation system to this activity (which would result in increased emissions) no other control technology is technically feasible.

CORRESPONDENCE DISTRIBUTION COVERSHEET

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Subject: NOTICE OF CONSTRUCTION FOR ORGANIC REMOVAL FROM TANK 241-C-103

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