OFFICE OF RIVER PROTECTION
P.O. Box 450, MSIN H6-60
Richland, Washington 99352

AUG 1 2 2015

15-ECD-0040

Ms. Jane A. Hedges, Program Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354

Ms. Hedges:

U.S. DEPARTMENT OF ENERGY, OFFICE OF RIVER PROTECTION SUBMITS THE CRITERIA & TOXICS AIR EMISSIONS NOTICE OF CONSTRUCTION MODIFICATION, REV. 3, OF WASHINGTON STATE DEPARTMENT OF ECOLOGY ORDER DE11NWP-001 FOR THE OPERATION OF VENTILATION SYSTEMS IN THE 241-AP, 241-SY, AND 241-AY/AZ TANK FARMS, TOC-ENV-NOC-5241 (ATTACHMENT 1)

U.S. Department of Energy, Office of River Protection hereby submits to Washington State Department of Ecology the Criteria & Toxics Air Emissions Notice of Construction Modification for the Operation of the Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms, TOC-ENV-NOC-5241 (Attachment 1).

The Notice of Construction Modification addresses:

- The installation of a new ventilation system in the 241-SY Farm
- The operation of the existing ventilation system in the 241-AP Tank Farm and the installation and operation of a new ventilation system in 241-AP Tank Farm
- The operation of the existing tank farm ventilation system in the 241-AY/AZ Tank Farm, including the operation of the annulus exhauster for tank AY-102, and the operation of a portable exhauster to ventilate tank AY-102 during waste retrieval operations.

Washington State Department of Ecology form ECY 070-410 (Attachment 2) is also submitted with Notice of Construction Application and Payment Information.

If you have any questions, please contact Dennis W. Bowser, Environmental Compliance Division, (509) 373-2566.

Kevin W. Smith
Manager

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Attachments: (2)

cc w/attach:
P.M. Gent, Ecology
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Administrative Record
Environmental Portal, LMSI
WRPS Correspondence

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Attachment 1
15-ECD-0040
(180 Pages)

Criteria & Toxics Air Emissions Notice of Construction for the Operation of Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms

Dennis W. Bowser

DOCUMENT RELEASE AND CHANGE FORM

Prepared For the U.S. Department of Energy,
Assistant Secretary for Environmental Management
By Washington River Protection Solutions, LLC., PO Box 850, Richland, WA 99352
Contractor For U.S. Department of Energy, Office of River Protection, under Contract DE-AC27-08RV14800

1a. Doc No: TOC-ENV-NOC-5241 **Rev.** 00A

1b. Project Number: ☒ N/A

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Printed in the United States of America.

Release Stamp

DATE: Jul 28, 2015 HANFORD RELEASE

2. Document Title

Criteria & Toxics Air Emissions Notice of Construction for the Operation of Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms

3. Design Verification Required

☐ Yes ☒ No AS 7/28/15

4. USQ Number ☒ N/A

5. PrHA Number ☒ N/A
Rev.

6. USQ Screening:

a. Does the change introduce any new failure modes to the equipment? ☐ **Yes** ☒ **No**
Basis is required for Yes:_____

b. Does the change increase the probability of existing failure modes? ☐ **Yes** ☒ **No**
Basis is required for Yes:

c. For Safety Significant equipment, does the change require a modification to Chapter 4 of the DSA and/or FRED? ☐ **Yes** ☐ **No** ☒ **N/A**
Basis is required for Yes:

7. Description of Change and Justification (Use Continuation pages as needed)

Minor revision processed to correct pagination error and indicate portable exauster can be located inside or outside for the AY/AZ tank farm.

8. Approvals

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Document Control Approval	SCALES, ANTHONY C	SCALES, ANTHONY C	07/28/2015
Environmental Protection	KLAGES, DEANNA L	KLAGES, DEANNA L	07/23/2015
Originator	MISKHO, ANTHONY (TONY)	MISKHO, ANTHONY (TONY)	07/23/2015
Responsible Manager	BORNEMAN, LUCINDA E	BORNEMAN, LUCINDA E	07/23/2015

9. Clearance Review:

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☐ Export Control Information (ECI)
☐ Official Use Only Exemption 2-Circumvention of Statute (OUO-2)
☐ Official Use Only Exemption 3-Statutory Exemption (OUO-3)
☐ Official Use Only Exemption 4-Commercial/Proprietary (OUO-4)
☐ Official Use Only Exemption 5-Privileged Information (OUO-5)
☐ Official Use Only Exemption 6-Personal Privacy (OUO-6)
☐ Official Use Only Exemption 7-Law Enforcement (OUO-7)

DOCUMENT RELEASE AND CHANGE FORM

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Document Number	Rev.	Title

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Document Number	Rev.	Title
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RPP-ENV-48229	00	CRITERIA & TOXICS AIR EMISSIONS NOTICE OF CONSTRUCTION FOR THE OPERATION OF THE 241-AP, 241-SY, AND 241-AY/AZ TANK FARM VENTILATION SYSTEM UPGRADES
SVF-4087	00	Toxic Air Emissions For AY-102 Project

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DOCUMENT RELEASE AND CHANGE FORM CONTINUATION SHEET	**Document No:** TOC-ENV-NOC-5241 **Rev.** 00A

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TOC-ENV-NOC-5241, Rev. 0A

Criteria and Toxics Air Emissions Notice of Construction for the Operation of the Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms

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Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-08RV14800

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Abstract: The Notice of Construction addresses the installation of a new ventilation system in the 241-SY Farm; the operation of the existing ventilation system in the 241-AP Tank Farm and the installation and operation of a new ventilation system in 241-AP Tank Farm; and the operation of the existing tank farm ventilation system in the 241-AY/AZ Tank Farm, including the operation of the annulus exhauster for tank AY-102, and the operation of a portable exhauster to ventilate tank AY-102 during waste retrieval operations.

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APPROVED
By GE Bratton at 2:48 pm, Jul 28, 2015

Release Approval Date

DATE:
Jul 28, 2015
HANFORD RELEASE

Release Stamp

Approved For Public Release

RECORD OF REVISION	(1) Document Number TOC-ENV-NOC-5241	Page 1 of 1

(2) Title
Criteria & Toxics Notice of Construction for the Operation of Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms

Change Control Record

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) DA/TA Date
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Criteria & Toxics Air Emissions Notice of Construction for the Operation of Ventilation Systems in the 241-AP, 241-SY, and 241-AY/AZ Tank Farms

Prepared by:
Washington River Protection Solutions, LLC

Date Published
July 2015

Prepared For:

United States Department of Energy
Office of River Protection
P.O. Box 550
Richland, Washington

Approved for Public Release;
Further Dissemination Unlimited

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EXECUTIVE SUMMARY

This document serves as a notice of construction pursuant to the requirements of *Washington Administrative Code* 173-400, "General Regulations for Air Pollution Sources," and *Washington Administrative Code* 173-460, "Controls for New Sources of Toxic Air Pollutants," for operation of ventilation systems in the 241-SY, 241-AP, and the 241-AY/AZ Tank Farms. This document is an update to the original application to reflect new operations of ventilation systems in those farms. This will cover the installation of a new ventilation system in the 241-SY Farm. This will cover the operation of the existing ventilation system in the 241-AP Tank Farm and the installation and operation of a new ventilation system. This will cover the operation of the existing tank farm ventilation system in the 241-AY/AZ Tank Farm, the operation of the annulus exhauster for tank AY-102, and the operation of a portable exhauster to ventilate tank AY-102 during waste retrieval operations. Operation of the ventilation systems will be for the storage, treatment, retrieval, sampling, transfers, mixing and disposal of the waste in the tanks.

This document is an update to the original application to reflect new operations of ventilation systems in those farms. This will cover:

- installation of a new ventilation system in the 241-SY Farm,
- operation of the existing ventilation system in the 241-AP Tank Farm and installation and operation of a new ventilation system,
- operation of the existing tank farm ventilation system in the 241-AY/AZ Tank Farm,
- operation of the annulus exhauster for tank AY-102, and,
- operation of a portable exhauster to ventilate tank AY-102 during waste retrieval operations.

The combined emissions from all of the three farms ventilation systems for the criteria pollutants nitrogen oxides and volatile organics were found to be above the criteria for exemption in accordance with *Washington Administrative Code* 173-400. Emissions of toxic air pollutants for all three exhausters were analyzed and 91 toxics were found to potentially be emitted. Of the 91 toxics identified, 44 were found to be above the *Washington Administrative Code* 173-460 de minimis screening levels and 32 were found to be above the small quantity emission rate. Only dimethyl mercury was found to be above the acceptable source impact level. A second tier health impacts analysis was submitted with the initial application and approved to analyze the impact of emissions on public health. The modeling results show the impacts for dimethyl mercury have not increased.

A best available control technology for toxics evaluation was previously performed for each new primary tank farm ventilation system in this notice of construction application. The cost of installation of abatement technology would be very similar for the annulus exhauster for AY-102, the portable exhauster for AY-102, or to retrofit the 241-AP or 241-AY/AZ ventilation systems. The costs would be increased on a cost per ton of pollutant for the annulus exhauster since the emission are small and for the portable exhauster since it is only operational for a short duration of time. The technologies considered were eliminated due to technical infeasibilities or because the costs exceeded the amounts the Washington Department of Ecology considers to be

economically justifiable. The best available control technology for toxics was determined to be for the tank farm exhausters and the portable exhauster a de-entrainer, heater, pre-filter, and two banks of nuclear grade high efficiency particulate air filters in series. The best available control technology for toxics for the AY-102 annulus exhauster was determined to be two banks of nuclear grade high efficiency particulate air filters in series.

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Evaluation of Best Available Control Technology for Toxics (tBACT)
Double Shell Tank Farms Primary Ventilation Systems Supporting Waste
Transfer Operations B-1

LIST OF TERMS

AERMOD	American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model
AOP	air operating permit
ASIL	acceptable source impact level
BACT	Best Available Control Technology
CAS	Chemical Abstracts Service
DOE	U.S. Department of Energy
DST	double-shell tank
Ecology	State of Washington, Department of Ecology
EPA	United States Environmental Protection Agency
EIS	environmental impact statement
HEPA	high-efficiency particulate air
HIA	Health Impacts Analysis
NOC	notice of construction
NO_x	nitrogen oxides
RCW	*Revised Code of Washington*
SEPA	State Environmental Policy Act
SQER	small quantity emission rate
TAP	toxic air pollutant
tBACT	Best Available Control Technology for Toxics
TWINS	Tank Waste Information Network System
VOC	volatile organic compounds
WAC	*Washington Administrative Code*
WFD	waste feed delivery
WTP	Waste Treatment and Immobilization Plant

UNITS

g/s	grams per second
gal	gallons
lb/yr	pound(s) per year
m	meter
scfm	standard cubic feet per minute
$\mu g/m^3$	microgram per cubic meter

METRIC CONVERSION CHART

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

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

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1.0 INTRODUCTION

This Notice of Construction (NOC) application is being submitted for approval in accordance with *Washington Administrative Code* (WAC) 173-400, "General Regulations for Air Pollution Sources," and WAC 173-460, "Controls for New Sources of Toxic Air Pollutants." This NOC application describes the operation of the ventilation systems in the 241-SY, 241-AP, 241-AY/AZ Tank Farms located in the 200 West and 200 East Areas of the Hanford Site. Operation of these ventilation systems will be for the storage, treatment, retrieval, sampling, and transfer of liquid/slurry wastes contained in the 200 West and 200 East Area tanks in support of future tank operation activities and waste feed delivery (WFD) to Hanford's Waste Treatment and Immobilization Plant (WTP).

This document is an update to the original application to reflect new operations of ventilation systems in those farms. This will cover the installation of a new ventilation system in the 241-SY Farm. This will cover the operation of the existing ventilation system in the 241-AP Tank Farm and the installation and operation of a new ventilation system. This will cover the operation of the existing tank farm ventilation system in the 241-AY/AZ Tank Farm, the operation of the annulus exhauster for tank AY-102, and the operation of a portable exhauster to ventilate tank AY-102 during waste retrieval operations.

Emissions of all criteria air pollutants and toxic air pollutants (TAPs) were estimated on a tank farm basis based upon tank concentration headspace data from the Tank Waste Information Network (TWINS) database. Due to uncertainties in waste transfers between tanks over the life of these projects, a conservative approach was taken to estimate emissions. Emissions were estimated based upon the highest per tank emission rate of each pollutant for all the tanks in both the 200 West and 200 East Areas. All of the tanks in each tank farm were then assumed to have the highest per tank emission rate for each pollutant. Finally, it was assumed that two tanks would be mixed or retrieved at any given time and a factor of 10 will be applied to their emissions to simulate the increased emission from mixing or retrieving. The estimated emissions assume that only two tanks are being mixed or retrieved in each tank farm for the entire year.

The emissions for criteria pollutants were estimated to be below the regulatory exemption levels with the exception of nitrogen oxides (NO_x) and total volatile organic compounds (VOCs) as shown in Appendix A. Estimated NO_x emissions are 7,630 lbs/year and the estimated VOC emissions are 20,132 lbs/year. Both of these levels exceed the 4,000 lb/year exemption level in WAC 173-400-110(5)(b).

Emissions of all TAPs as defined in WAC 173-460-150 were estimated applying the same methodology used for the criteria pollutants using the TWINS database. A total of 91 TAPS were found but only 44 were above the de minimis emission screening level, while 32 were above the small quantity emission rate (SQER), and one was above the acceptable source impact level (ASIL). Dimethyl mercury was found to be above the ASIL and a second tier petition Health Impacts Analysis (HIA), as required in WAC 173-460-090, will be submitted separately.

Appendix B contains a copy of RPP-ENV-46679, *Evaluation of Best Available Control Technology for Toxics (tBACT) Double Shell Tank Farms Primary Ventilation Systems Supporting Waste Transfer Operations.* The technologies considered were eliminated due to technical infeasibilities or because the costs exceeded the amounts the Washington Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) considers to be

economically justifiable. Based on the results of the tBACT evaluation, the proposed tBACT control technology for the double-shell tank (DST) primary ventilation systems and the portable exhauster consists of a moisture de-entrainer, pre-heater, pre-filters, and two banks of nuclear grade high efficiency particulate air (HEPA) filters in series. For the AY-102 annulus exhauster, the proposed tBACT control technology consists of a heater and two banks of nuclear grade HEPA filters in series.

2.0 FACILITY IDENTIFICATION AND LOCATION

The DST farms are located at:

U.S. Department of Energy, Office of River Protection
Hanford Site
200 East and West Area Tank Farms
Richland, WA 99352

The DSTs are located in the 200 East and 200 West Areas of the Hanford Site (See Figure 1). A brief description of each tank farm follows. Table 1 lists the locations of the tank farms.

241-SY Tank Farm: The 241-SY Tank Farm consists of three buried DSTs in the 200 West Area. The tanks each have a capacity of 1.16 million gallons (gal). The 241-SY Tank Farm is the only DST in the West Area and is the transfer point between the West Area and the East Area, where waste will be treated. The 241-SY Tank Farm was placed into service in 1977. Figure 2 shows a map of the 241-SY Tank Farm and Figure 3 is an aerial photograph of the farm. The three tanks are numbered 241-SY-101, 241-SY-102, and 241-SY-103.

Current 241-SY exhausters are assigned stack numbers 296-S-25 ("A" Train) and 296-P-23 ("B" Train) and operate alternately. They are listed in the *Hanford Site Air Operating Permit* (AOP) Number 00-05-006 under emission points S-296S025-001 (296-S-25) and P-296SY-001 (296-P-23). The new assigned 241-SY exhauster stack numbers are 296-S-026 ("A" Train) and 296-S-027 ("B" Train) and will operate as one exhauster being primary and the other secondary, only one exhauster will operate at a time. At the completion of testing, the old exhausters will be disconnected, power disconnected, and removed at a later date.

241-AP Tank Farm: The AP Tank Farm consists of eight buried DSTs in the 200 East Area. The tanks each have a capacity of 1.16 million gal. The AP Tank Farm will be the transfer point for low activity waste from the 200 East Area to the WTP. The AP Tank Farm was placed into service in 1986. Figure 4 shows a map of the AP Tank Farm and Figure 5 is an aerial picture of the AP Tank Farm. The tanks are numbered 241-AP-101 through 241-AP-108.

The current 241-AP exhauster is assigned stack number 296-A-40 and consists of two exhaust trains that operate alternately with a shared stack. The existing stack is listed in the AOP Number 00-05-006 under emission point P-296AP-001 (296-A-40).

The new assigned 241-AP exhauster stack numbers are 296-A-048 ("A" Train) and 296-A-049 ("B" Train) and will operate as one exhauster being primary and the other secondary, only one exhauster will operate at a time. At the completion of testing, the old exhausters will be disconnected from the tank ventilation ducting, power disconnected, and removed at a later date.

241-AY and 241-AZ Tank Farms: The 241-AY Tank Farm and the 241-AZ Tank Farm each have two buried DSTs in the 200 East Area. The AY and AZ Tank Farms were placed into service in 1971 and 1977, respectively. A map of the AY and AZ Tank Farms is shown in Figure 6. Due to the proximity of the two tank farms, it is possible to use one exhauster system to ventilate both farms. Figure 7 shows an aerial photo of the 241-AY, 241-AZ and nearby 241-AX Tank Farms. The tanks are numbered: 241-AY-101, 241-AY-102, 241-AZ-101, and 241-AZ-102.

The current 241-AY/AZ exhauster system consists of two exhaust trains. The stack is assigned number 296-A-42, and is listed in the AOP Number 00-05-006 under emission points P-296A042-001 (296-A-42).

The current 241-AY-102 annulus exhauster, which ventilates the space between the primary tank and the secondary containment liner, consists of one exhaust train with two banks of HEPA filters in series. Tank AY-102 has leaked from the primary tank into the surrounding annulus. The annulus exhauster is assigned number 296-A-19, and is listed in the AOP under emission point P-296A019-001.

Tank AY-102 is being emptied and it might be necessary to provide additional ventilation during retrieval operations. If necessary, a portable exhauster located either inside or outside of the tank farm area, will be connected to tank AY-102 to ventilate only that tank and will only be operated during retrieval activities. The portable exhauster 296-P-50 (POR 127) will be used on tank 241-AY-102 and it is listed in the AOP under emission point 296P050-001.

Figure 1. The Hanford Site.

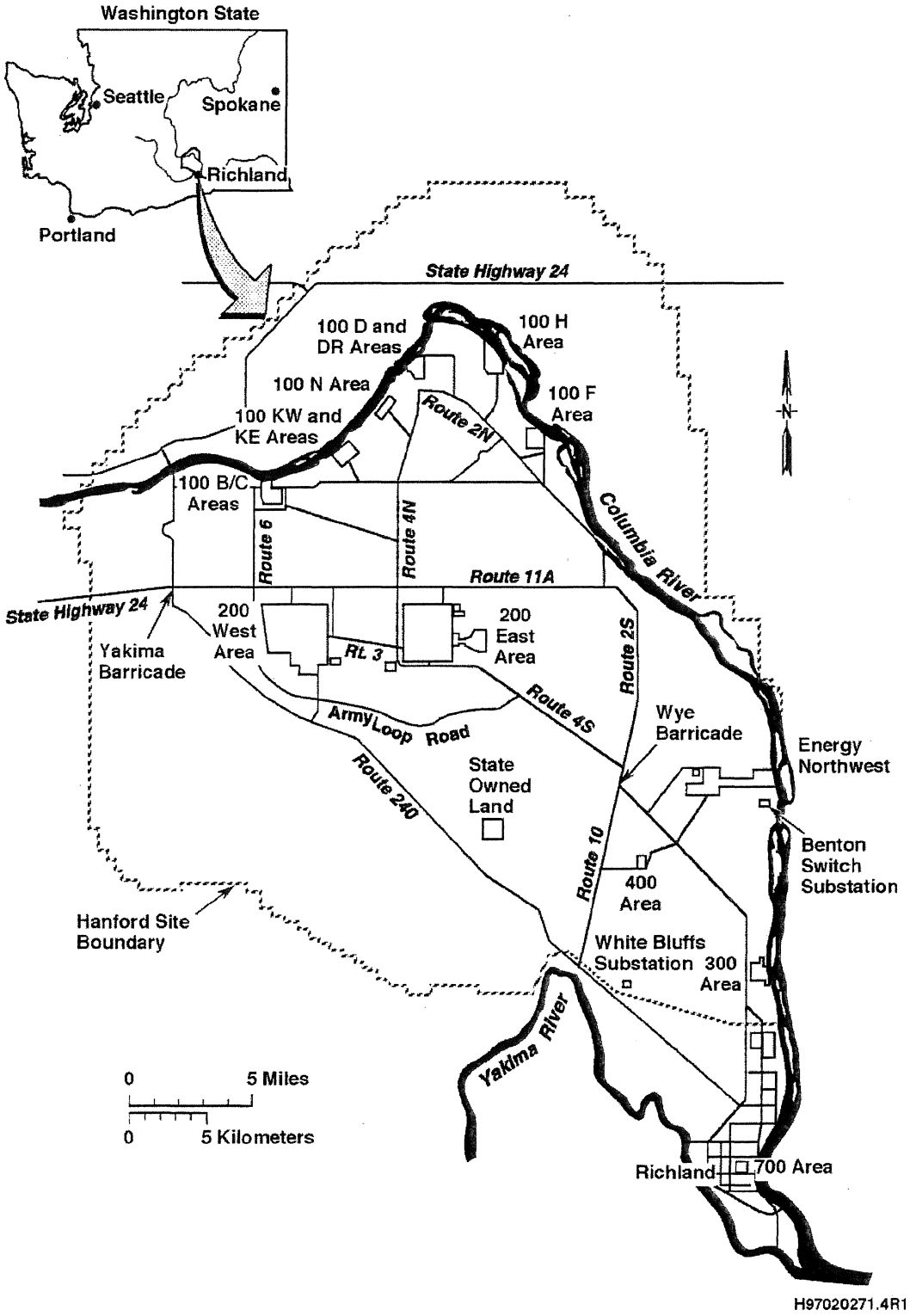


Table 1. Tank Farm Locations.

Tank Farm	Latitude	Longitude
241-AP	46° 33' 07" N	119° 30' 57" W
241-SY	46° 32' 26" N	119° 37' 40" W
241-AY/AZ	46° 33' 18" N	119° 31' 03" W

Figure 2. Location of 241-SY Tank Farm.

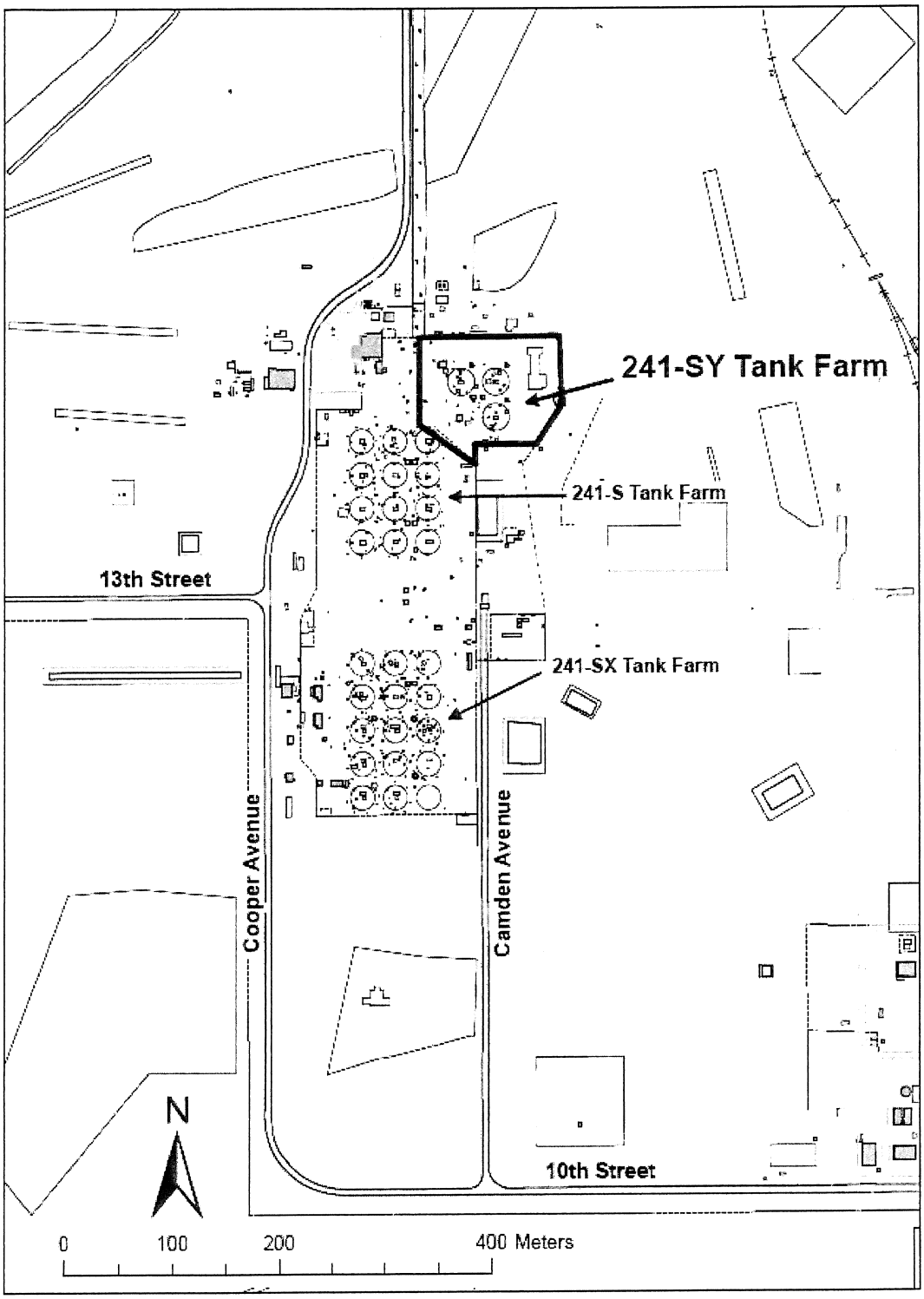


Figure 3. Aerial View of 241-SY Tank Farm.

Figure 4. Location of 241-AP Tank Farm.

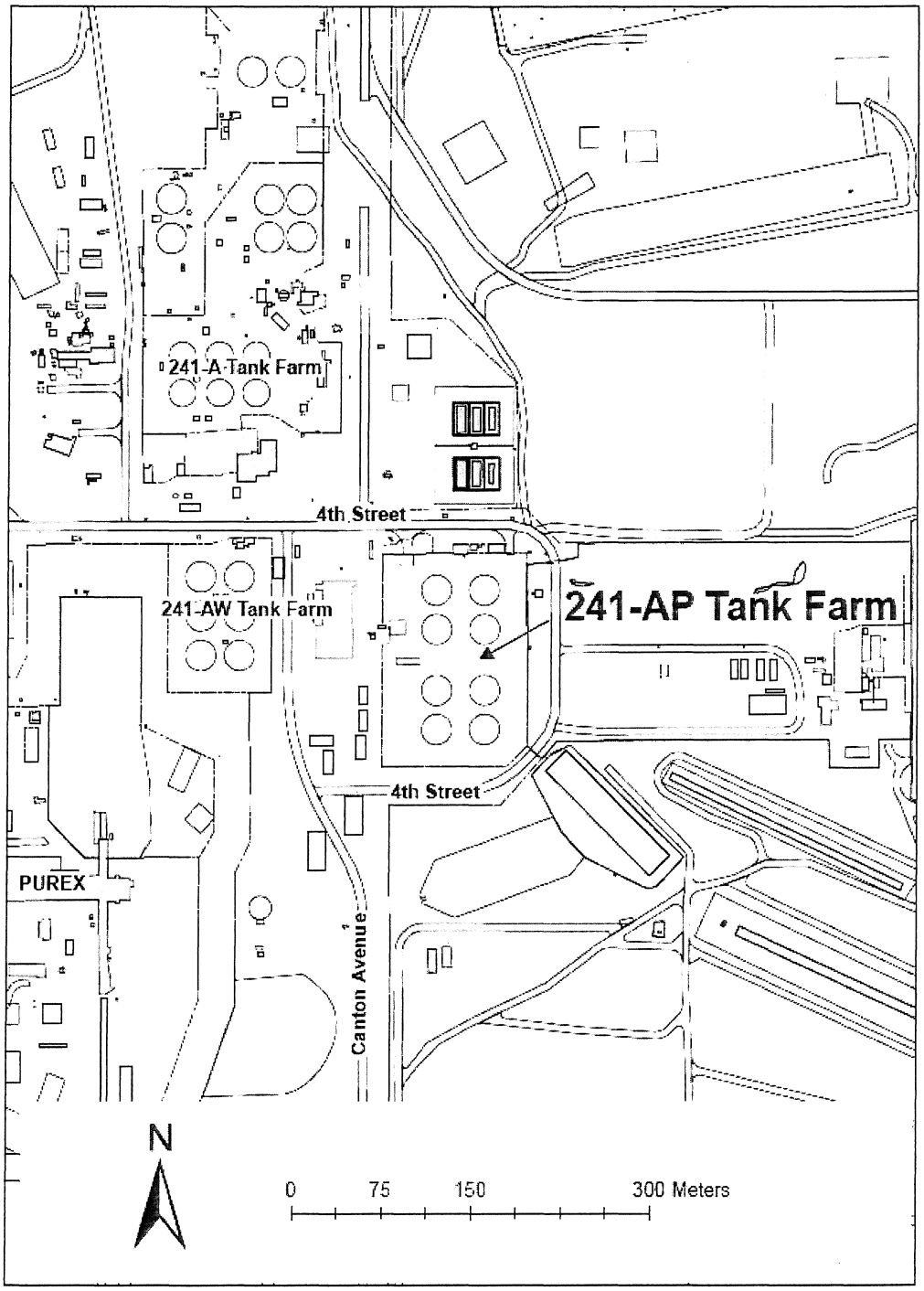


Figure 5. Aerial View of 241-AP Tank Farm.

Figure 6. Location of 241-AY and 241-AZ Tank Farms.

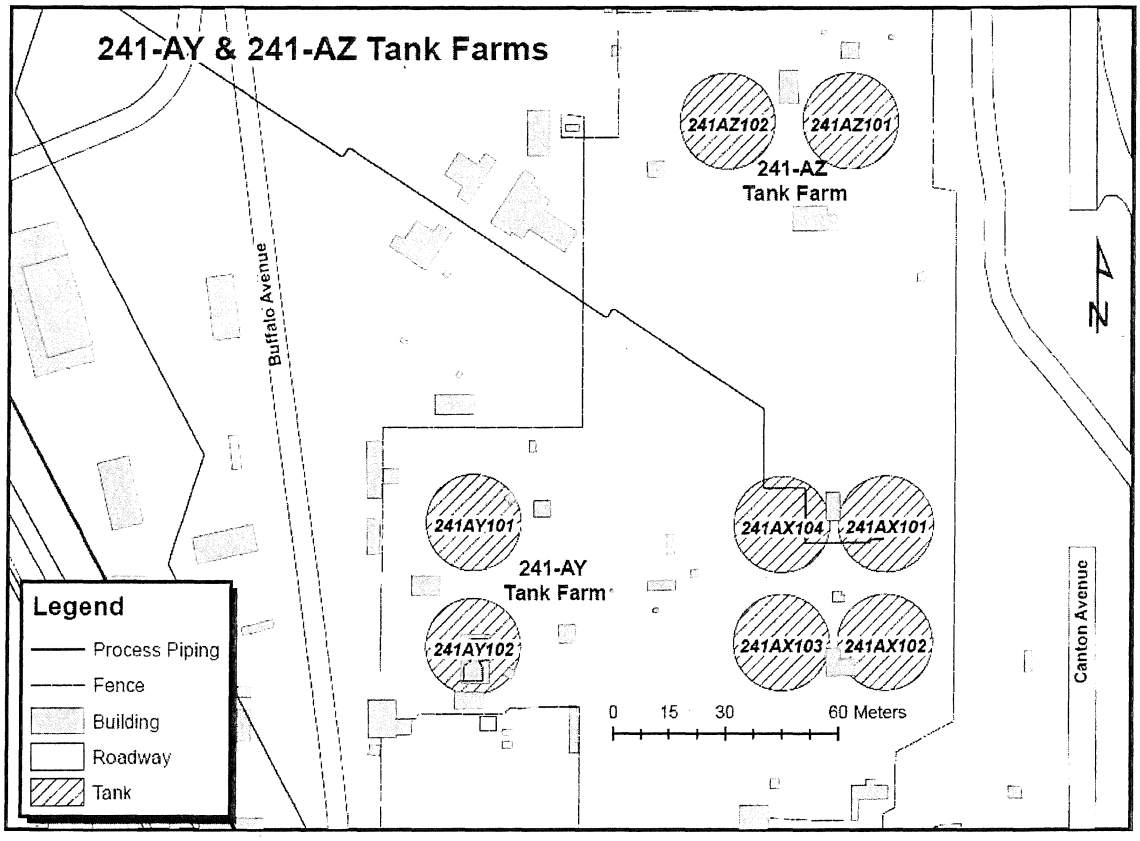


Figure 7. Aerial View of 241-AY, 241-AZ and 241-AX Tank Farms.

3.0 RESPONSIBLE MANAGER

The current responsible facility manager is:

Kevin W. Smith, Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 550
Richland, Washington 99352
(509) 372-2315

4.0 PROPOSED ACTION

This NOC application is submitted for approval to:

- operate the existing 241-AP, and 241-AY/AZ primary ventilation system exhausters,
- operate the AY-102 annulus exhauster,
- install and operate new 241-SY and 241-AP primary ventilation system,
- operate a portable exhauster for ventilation of tank AY-102 for waste retrieval.

Approval is requested in this application to operate these ventilation systems during operations for waste storage, treatment, retrieval, sampling, and transfers of the waste to the WTP. The 241-SY and 241-AP exhausters are being upgraded with increased air flow rates because thermal hydraulic analysis of the WFD process determined that increased air flow rates were necessary to assure the tanks are maintained within operating temperature limits.

The AY-102 tank is being pumped out due to loss of containment in the primary tank. The waste will be transferred from AY-102 to the 241-AP Tank Farm. A portable exhauster may be required for additional ventilation during retrieval of tank AY-102.

The activities proposed with this NOC revision will increase emissions during retrieval and WFD activities.

4.1 241-SY TANK FARM

The activities proposed in this NOC for the 241-SY Tank Farm include:

- Site preparation for the new exhauster skids.
- Isolation and removal of the existing exhausters.
- Installation of the new exhausters.
- Operation of one exhaust fan and train with a flow rate of 1,360 standard cubic feet per minute (scfm) for storage operations and most retrieval and sampling activities.
- Operation of one exhaust fan and train with a maximum flow rate of up to 2,500 scfm for WFD and retrieval operations.

The planned schedule for the installation of the 241-SY Exhauster is 2017. The exhauster was designed for a 40-year design life.

4.2 241-AP TANK FARM

The activities proposed in this NOC for the 241-AP Tank Farm include:

- Operation of the existing ventilation system (296-A-40) with a flow rate of 1,000 scfm.
- Site preparation for the new exhauster skids.
- Isolation and removal of the existing exhausters.

- Installation of the new exhausters.
- Operation of the new exhausters with one exhaust fan and train with a flow rate of 1,500 scfm for storage, operations, and most retrieval and sampling activities.
- Operation of the new exhausters with one exhaust fan and train with a maximum flow rate of up to 3,000 scfm for retrieval and WFD.

The planned startup for the operation of the new 241-AP Exhausters are early 2016. The exhauster were designed for a 40-year design life.

4.3 241-AY/AZ TANK FARMS

The activities proposed in this NOC for the 241-AY/AZ Tank Farm include:

- Operation of the 241-AY/AZ exhauster.
- Operation of the AY-102 annulus exhauster.
- Operation of a portable exhauster for waste retrieval operations.

The start of operation of the portable exhauster for AY-102 retrieval is scheduled for early 2016.

5.0 STATE ENVIRONMENTAL POLICY ACT

This project fulfills the requirements of *Washington Administrative Code* (WAC) 197-11 and *Revised Code of Washington* (RCW) 43.21C.030(2)(C), "Guidelines for state agencies, local governments – Statements –Reports – Advice –Information," per RCW 43.21C.150, "RCW 43.21C.030(2)(c) inapplicable when statement previously prepared pursuant to national environmental policy act." which states, "*The requirements of RCW 43.21C.030(2)(c) pertaining to the preparation of a detailed statement by branches of government shall not apply when an adequate detailed statement has been previously prepared pursuant to the national environmental policy act of 1969, in which event said prepared statement may be utilized in lieu of a separately prepared statement under RCW 43.21C.030(2)(c).*" The document that meets the agencies review needs for the current proposal is:

DOE/EIS-0391, *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*, Volume 2, Book 2, Appendix E.1.1.1.2., Operations and Maintenance.

The lead agency is the Office of River Protection, U.S. Department of Energy and the contact person is Mary Beth Burandt, Document Manager and her phone number is (509) 372-8828.

6.0 CHEMICAL AND PHYSICAL PROCESS

The 241-SY, 241-AP, and 241-AY/AZ Tank Farms all contain DSTs. The inner shell of each DST is constructed from heat-treated, stress-relieved steel, and the outer shell is constructed of non-stress-relieved steel. The inner tank where the waste is stored is 75 feet in diameter and is approximately 47 feet high at the crown. The two shells are separated by a 2.5-foot annulus, and both shells are contained within a concrete encasement.

Waste stored in the tanks consists of hazardous chemicals regulated under the *Resource Conservation and Recovery Act of 1976* and radioactive isotopes regulated under the *Atomic Energy Act of 1954*. The DSTs are used to store, treat, or transfer waste to the WTP. The tanks contain mixed waste in the form of liquids and suspended or settled solids. Gases are generated by the reaction of radioactive and hazardous chemicals in the tanks. The contents of the tanks may be mixed periodically to entrain the solids. During storage activities, retrieval, and mixing, the ventilation system maintains the headspace in each tank below atmospheric pressure for containment of radioactive particulates.

The ventilation systems contain the radioactive particulates present in the tank headspace, remove heat and the flammable gases and vapors that evolve from the liquid surface. The ventilation systems operate by drawing outside air into the headspace. The air is drawn out of the tanks via a riser into a common ventilation header. The header is then connected to the exhauster. See Section 7 for a discussion of the exhauster process and abatement systems.

During storage operations, the tank waste is quiescent. Retrieval of wastes from tanks will involve periodic transfers of waste between tanks. Supernatant from DSTs might be used to help mobilize sludge in the DSTs or SSTs, and the resulting waste will be transferred back to the DSTs. Waste will also be transferred between and among tanks for space management. In the 200 East Area, waste will also be transferred between tanks to reach the 242-A Evaporator for volume reduction. Periodic sampling will also occur. The 241-SY Tank Farm will receive waste transfers from the 222-S Laboratory.

For waste transfer operations, a maximum of two mixer pumps and a transfer pump will be installed in each of two tanks in a farm. Waste transfers and testing will occur prior to WTP operation. The mixer pumps will be run to ensure that the waste is a homogeneous mixture for sampling and delivery to the WTP. Mixer pumps are operated in a batch mode as needed to maintain waste uniformity during staging and to mix the waste for a period of time before and during transfer. As required by operational directives, mixer pumps will be operated until waste samples verify that adequate mixing has occurred. Waste samples will be collected periodically. If dilution/conditioning is needed, the pH and temperature of the diluents will be adjusted by means of a caustic supply system.

The contents in each tank could be mixed periodically to control gas entrapment in the settled solids, to control temperature, to perform chemical treatment, or for waste retrieval. Contained solids are mobilized as part of the hydraulic action of the mixer pumps or by using air lift circulators in each of the tanks. Mobilization of solids normally occurs in a single tank at a time. During mixing as well as storage, the ventilation system will maintain the headspace below atmospheric pressure.

7.0 EMISSION ESTIMATES

Criteria and toxic air pollutants emissions are estimated and reported in RPP-RPT-44009, *Spreadsheet Description Document for Non-Rad Air Source Term for 241 -SY Farm and 241 – AP Farm Primary Ventilation System Upgrades,* and SVF-1821, *Non-Radiological Air Source Term for 241-SY Farm and 241-AP Farm Primary Ventilation System* on a per tank basis and a maximum tank farm basis. RPP-RPT-44009 and SVF-1821 calculate the maximum emissions for each TAP from all tanks, thus bounding the 241-AY/AZ exhauster emissions. For this analysis, the per tank emission rate from SVF-1821 was used to calculate the per tank farm emission rate for 241-SY, 241-AP, and 241-AY/AZ Tank Farms. Assumptions made in RPP-RPT-44009 for the evaluation were:

1. When the maximum value in the TWINS database is the measurement detection limit, that value is assumed to be the reported value.
2. Measurements were made over a quiescent waste and passively ventilated for all SSTs and actively ventilated DSTs. A constant emission rate was assumed as long as the tank waste remained quiescent.
3. SSTs were passively ventilated during measurements and each DST ventilation system was assumed to have a flow rate for each tank of 1,000 scfm divided by the number of tanks in the tank farm.
4. Based upon mixer pumps test in DST 241-AZ-101, it was assumed that the headspace concentrations increased by a factor of 10 during waste mixing activities (RPP-12735, *Tank Farm Source Term Document Corrections,* Rev. 0A).
5. No more than two tanks in a tank farm will have waste disturbing activities occurring simultaneously.
6. The emission rate from the highest tank for each TAP is contained in all tanks in the DST tank farm.

The unabated emissions of criteria and toxic pollutants from the 241-SY, 241-AP and 241-AY/AZ exhausters were estimated based upon measured headspace concentrations in the TWINS database. This database was searched for regulated criteria pollutants by the Chemical Abstracts Service (CAS) number for all tanks. Because waste transfers will occur between tanks during the lifetimes of the exhausters, the highest emission rate per tank was calculated. The maximum per tank emission rate was used for each farm, assuming that two of the tanks will be mixed in each farm.

7.1 ESTIMATED EMISSIONS OF CRITERIA POLLUTANTS

The annual emissions of criteria pollutants are shown in Table A-1 in Appendix A. Only NO_x and VOCs were above the de minimis annual emission limit of 4,000 lbs/year. Nitrogen oxides had an annual emission rate of 7,630 lbs/year while volatile organic compound emissions were estimated to be 20,100 lbs/year.

7.2 ESTIMATED EMISSIONS OF TOXIC AIR POLLUTANTS

The emissions of TAPs are shown in Table A-2 in Appendix A. Ninety-one TAPs were identified in the tank headspace. Of these, only 44 had emissions above the de minimis emission

threshold in WAC 173-460-150. Only 32 TAPs had emission rates above the SQER emission thresholds. Only dimethyl mercury was above the ASIL and an HIA per WAC 173-460-090 is being submitted separately.

7.3 AIR DISPERSION MODELING

Ambient air concentrations at the Hanford Site boundary were estimated using the EPA American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model (AERMOD) dispersion model, Version 14134. EPA-454/B-03-001, *User's Guide for the AMS/EPS Regulatory Model – AERMOD,* was used as modeling guidance.

The model inputs included the physical parameters of each stack (Table 2):

Table 2. Tank Exhauster Parameters.

	241-SY (New)	241-AP (Existing)	241-AP (New)	241-AY/AZ (Existing)	AY-102 Annulus	AY-102 Portable
Stack Height (ft)	40	19.6	40	55	12.9	50
Maximum Flow Rate (scfm)	2,500	1,000	3,000	1,000	3,800	1,600

Due to this application covering multiple possible exhauster operating configurations, multiple runs of AERMOD were performed to estimate the most conservative modeling estimate. The cases considered (Table 3) were the following:

Table 3. Exhauster Operating Configurations.

	Case 1	Case 2	Case 3	Case 4
241-AY/AZ	Operating	Operating	Operating	Operating
AY-102 Annulus	Operating	Operating	Operating	Operating
AY-102 Portable	Not Operating	Not Operating	Operating	Operating
241-AP (Existing)	Operating	Not Operating	Operating	Not Operating
241-AP (New)	Not Operating	Operating	Not Operating	Operating

The public access points to the site were used as the site boundaries. The surface meteorological inputs were from the Hanford Meteorological Station and the upper air data was obtained from the Spokane, Washington, National Weather Service for the years 2009 through 2013. Digital elevation model data from the U.S. Geological Survey was used for model terrain input. The regulatory default mode was used. Based upon Ecology's 08-02-025, *Guidance Document:*

First, Second, and Third Tier Review of Toxic Pollution Source, Table 4 indicates that the receptor grid spacing was:

Table 4. Ecology Recommended Receptor Grid Spacing.

Distance from Source (m)	Grid Spacing (m)
0 – 350	10
350 – 800	25
800 – 4,000	50
4,000 – 8,000	100
8,000 30,000	200

The new exhausters were also assumed to be operating during mixing or retrieval operations for the entire year to ensure that the worst case situation was modeled.

A total unitary emission rate for all exhausters of 1 gram per second (g/s) was used based upon the ratio of the emission factors per tank farm to the total of the three exhausters' emissions. This method allowed for the actual exhaust rate for each TAP from all the exhausters to be multiplied by the conversion factor to achieve the dispersed concentration. The 241-SY Tank Farm had an emission factor of 21, two tanks being mixed or retrieved and one quiescent. The 241-AP Tank Farm had an emission factor of 26, two tanks mixed or retrieved and 6 tanks quiescent. The 241-AY/AZ Tank Farm had an emission factor of 22, two tanks mixed or retrieved and two tanks quiescent. The annulus had an emission rate of 0.00319 g/s based upon the tank waste being 1% of the total farm emissions. The emission factor for the 241-SY Tank Farm was 0.304 g/s (21/69). The 241-AP Tank Farm the emission factor was 0.377 g/s (26/69). The total 241-AY/AZ Tank Farm emission factor was 0.319 g/s (22/69).

Table 5 shows the most conservative dispersion factors for all four cases listed in Table 3 and the associated case and year along with the location of the highest receptor. The receptor with the highest concentration for the 1-hour and annual time averaging periods were along Highway 240 to the south and west of the 200 West Area. The 24-hour averaging period highest concentration was across the Columbia River to the northeast of the 200 East Area.

Table 5. Air Dispersion Factors.

Averaging Period / Case #	($\mu g/m^3$ per g/s)	Easting (m)	Northing (m)
1-hour (Case 3-2013)	16	294,645	5,155,837
24-hour (Case 1-2013)	1.5	316,427	5,167,599
Annual (Case 1-2013)	0.075	300,518	5,152,270

The air dispersion factors, based upon the specific TAP averaging period, were multiplied by the total emission rate in g/s for the three tank farm exhausters to calculate the ambient air concentrations shown in Table A-2.

7.4 ESTIMATED AMBIENT CONCENTRATIONS COMPARED TO WAC 173-460-150 THRESHOLDS

The results of the emissions and modeling are shown in Table A-2 in Appendix A. Only dimethyl mercury exceeded the WAC 173-460-150 ASIL limits. The dispersed dimethyl mercury concentration was modeled to be 6.2E-08 microgram per cubic meter ($\mu g/m^3$). An HIA was previously submitted describing the anticipated effect on human health from the dimethyl mercury emissions. The modeled concentration is actually lower than the previous HIA due to changing the years modeled.

8.0 TANK VENTILATION PROCESS AND EMISSION CONTROL SYSTEMS

The abatement technology for the new systems in 241-SY and 241-AP Tank Farms are described in RPP-SPEC-42594, *Procurement Specification SY/AP Primary Exhauster Skid For Waste Tank Ventilation*. The abatement technology for the current system in the 241-AP Tank Farm is described in RPP-15124, *System Design Description for AP Tank Farm Ventilation Tank Primary System*. The abatement technology for the current primary system in the AY/AZ Tank Farm is described in RPP-15127, *System Design Description for AY/AZ Tank Farm Ventilation Tank Primary System and Associated Cooling Water Systems*. The abatement technology for the AY-102 annulus exhauster is described in RPP-15128, *System Design Description for AY/AZ Tank Farm Annulus Ventilation Systems (DSA Based)*.

The ventilation systems remove particulates and moisture, collect condensate, and reduce relative humidity in the exhaust stream. Inlet air for the tanks is primarily provided through inlet air filters, along with air infiltration through process pits and tank risers. Air flows from the tank to a common header. The major components of this DST primary ventilation system are:

- Cooler — (optional) may be installed prior to mixing (not a part of tBACT)
- De-entrainer
- Heater
- Pre-filter
- HEPA filter banks in series (2)
- Fans
- Exhaust stack
- Monitoring and control instruments and equipment.

The air from the common header passes through a de-entrainer to remove large water droplets. The air next passes through a heater to lower the relative humidity, and then through a pre-filter to remove large particles. The de-entrainers and heaters help protect the HEPA filter media from wetting, which could lead to wicking of contamination, plugging of a filter, or wetting of the exhaust system sample system filter and sample media. The air next passes through two nuclear grade HEPA filters that are rated to remove particles as small as 0.3 μm in diameter with a rated efficiency of no less than 99.97%. The face dimensions of the filters are 24 inches by 24 inches and the filter media is 11.5 inches deep. The monitoring and control instrumentation ensures that the pressure drop across the HEPA filters is within tolerances. The primary ventilation system will collect all condensate and return it to a designated DST.

The systems may incorporate coolers to keep the air temperature within the operational range of the HEPA filters. The coolers, if necessary, would be placed on a skid before the de-entrainers. Testing of the heat generated from the mixer pumps will be conducted to determine if coolers are necessary.

Due to the low emissions, the AY-102 annulus exhauster only has two banks of HEPA filters in series, a fan, exhaust stack, and monitoring and control instrumentation.

8.1 BEST AVAILABLE CONTROL TECHNOLOGY

Pursuant to WAC 173-400-113(2), an analysis of Best Available Control Technology (BACT) for emissions of criteria pollutants was performed as well as a Best Available Control

Technology for Toxics pursuant to WAC 173-460-060 (2) for toxics. Appendix B contains a copy of RPP-ENV-46679, *Evaluation of Best Available Control Technology for Toxics (tBACT) Double Shell Tank Farms Primary Ventilation Systems Supporting Waste Transfer Operations.* This document serves as the tBACT analysis for this NOC application. The tBACT was based upon emissions from the 241-AP Tank Farm and is bounding for the other tank farms.

The tBACT analysis was performed using the "top-down" approach established for BACT. The approach consists of the following steps:

1) Identify all control technologies
2) Eliminate technically infeasible options
3) Rank remaining control technologies by control effectiveness
4) Evaluate most effective controls and document results
5) Select BACT.

Toxics with similar chemical and physical properties were grouped together with the assumption that similar control technologies would be effective. The four groups identified were:

- Ammonia
- Toxic organic compounds
- Mercury and mercury related compounds
- Particulate metal compounds.

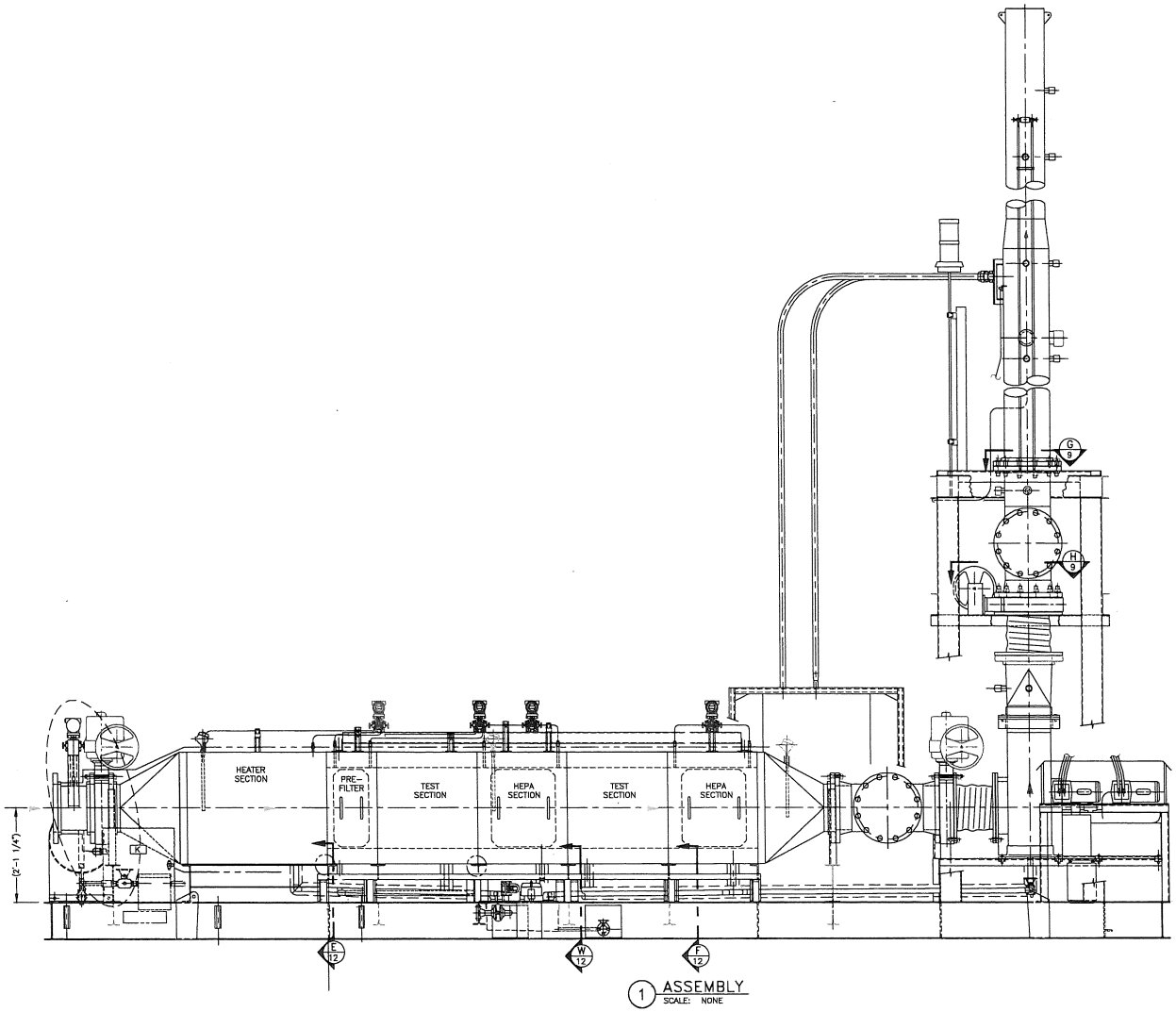
A detailed evaluation of the emission control technologies was performed. After an effectiveness analysis, a cost per ton of pollutant removed was calculated. Most of the costs per ton exceeded the cost ceiling estimates guidelines previously approved by Ecology and EPA as economically justifiable. Due to the low emission rates, the cost per ton to remove the pollutants becomes prohibitively expensive.

Based upon the results of this tBACT, the proposed tBACT control technology for the DST primary ventilation system consists of a moisture de-entrainer, heater, pre-filter, and two banks of nuclear grade HEPA filters in series. The proposed tBACT for the annulus is two banks of nuclear grade HEPA filters in series.

9.0 APPLICABLE CONTROL TECHNOLOGY DRAWINGS

Figure 8 shows a general tank farm exhauster design. The design includes a de-entrainer, heater, pre-filter, and two banks of nuclear grade HEPA filters in series and exhaust stack.

Figure 8. Exhauster Layout



10.0 MONITORING DURING OPERATIONS

Annual sampling is proposed for NO_x and VOCs emissions are estimated to be above the SQERs. Annual sampling is also proposed for the 3 TAPs closest to their respective ASIL values in addition to dimethyl mercury because it is above the ASIL.

11.0 REFERENCES

00-05-006, 2001, *Hanford Air Operating Permit*, Washington State Department of Ecology, Olympia, Washington.

Ecology's 08-02-025, 2013, *Guidance Document: First, Second, and Third Tier Review of Toxic Pollution Source, Washington State Department of Ecology, Lacey, Washington.*

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42 USC 2011, *Atomic Energy Act of 1954*, et seq.

National Environmental Policy Act of 1969, 42 USC 4321, et seq.

RCW 43.21C, "State Environmental Policy," *Revised Code of Washington*, as amended.

RPP-12735, *Tank Farm Source Term Document Corrections,* Rev. 0A. CH2MHill Hanford Group, Inc., Richland, Washington.

RPP-15124, *System Design Description for AP Tank Farm Ventilation Tank Primary System*, Rev. 3, Washington River Protection Solutions, Richland, Washington.

RPP-15127, *System Design Description for AY/AZ Tank Farm Ventilation Tank Primary System and Associated Cooling Water Systems*, Rev. 4, Washington River Protection Solutions, Richland, Washington.

RPP-15128, *System Design Description for AY/AZ Tank Farm Annulus Ventilation Systems (DSA Based)*, Rev. 2, Washington River Protection Solutions, Richland, Washington.

RPP-ENV-46679, *Evaluation of Best Available Control Technology for Toxics (tBACT) Double Shell Tank Farms Primary Ventilation Systems Supporting Waste Transfer Operations,* Washington River Protection Solutions, LLC, Richland, Washington.

RPP-RPT-44009 *Spreadsheet Description Document for Non-Rad Air Source Term for 241 -SY Farm and 241 –AP Farm Primary Ventilation System Upgrades*, Rev. 2, Washington River Protection Solutions, LLC., Richland, Washington.

RPP-SPEC-42594, 2010, *Procurement Specification SY/AP Primary Exhauster Skid For Waste Tank Ventilation,* Rev. 4, Washington River Protection Solutions, LLC., Richland, Washington.

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WAC 173-400, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, as amended.

WAC 173-460, "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code*, as amended.

WAC 197-11, "SEPA Rules," *Washington Administration Code*, as amended.