



0073585

STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

3100 Port of Benton Blvd • Richland, WA 99354 • (509) 372-7950

July 31, 2007

Ms. Shirley Olinger, Acting Manager  
Office of River Protection  
United States Department of Energy  
P.O. Box 450, MSIN: H6-60  
Richland, Washington 99352



Re: Approval of Criteria and Toxic Air Emissions Notice of Construction (NOC)  
Application, Hanford Single-Shell Tank Waste Retrieval

- References: 1. USDOE-RL Letter 07-ESQ-088, *Request for Modification to Criteria and  
Toxics Air Emissions Notice of Construction (NOC) Application for Operations  
of Waste Retrieval Systems in Single-Shell Tank (SST) Farms*, dated May  
15, 2007 6072878
2. Ecology Letter, *Determination of Complete Application, Single-Shell Tank  
Farms*, dated June 7, 2007 0073017

Dear Ms. Olinger:

The United States Department of Energy - Office of River Protection petitioned for approval of a Notice of Construction modification for the ventilation of Hanford Single-Shell Tank Waste Retrieval Operations (Reference 1). Ecology determined that your application was complete and provided you a proposed ORDER revision (Reference 2). This letter issues approval for ORDER revision and the petitioned operations.

Enclosed is ORDER No. **DE05NWP-002, Rev. 2**, authorizing the proposed operations. The enclosed ORDER may be appealed. Appeal procedures are described in the ORDER. Administrative revision of the Hanford Air Operating Permit, to incorporate provisions of this ORDER as requested in Reference 1, will follow this issuance.

This authorization can be modified, suspended, or revoked, in whole or in part, if Ecology finds that, due to inaccuracies in the petition request, compliance with ambient air quality standards is not ensured.

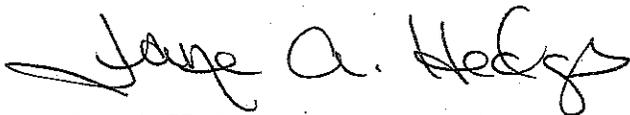
The proposed ORDER revision was subject to public review and comment from June 25, 2007, through July 25, 2007. No applicable comments were received adverse to the proposed ORDER. The Responsiveness Summary prepared to address comments will soon be available on the Ecology website at <http://www.ecy.wa.gov/programs/nwp/currentnews.htm>.



Mr. Shirley Olinger  
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If you have any questions, contact Doug Hendrickson at 509-372-7983.

Sincerely,



Jane A. Hedges  
Program Manager  
Nuclear Waste Program

dh/pll  
Enclosure

cc: Dennis Bowser, USDOE  
Mary Jarvis, USDOE  
Nancy Homan, FH  
Lucinda Penn, CH2M  
Chris Kemp, CH2M  
Stuart Harris, CTUIR  
Gabriel Bohnee, NPT  
Russell Jim, YN  
Susan Leckband, HAB  
Ken Niles, ODOE  
John Martell, WDOH *H-0-9*  
Administrative Record: AIR Permits *S-2-4*  
Environmental Portal

**NON-RADIOACTIVE AIR EMISSIONS  
NOTICE OF CONSTRUCTION APPROVAL ORDER  
CONDITIONS AND RESTRICTIONS**

**REGULATORY AUTHORITY:**

Pursuant to the Washington State Department of Ecology General Regulations for Air Pollution Sources, Chapter 173-400 Washington Administrative Code (WAC), and Controls for New Sources of Toxic Air Pollutants, Chapter 173-460 WAC, Ecology now finds the following:

**FINDINGS:**

1. The United States Department of Energy proposes to modify their existing facility (Hanford) located in Richland, Washington.
2. A Notice of Construction (NOC) application was submitted on July 22, 2004. The application was found to be complete on September 8, 2004.
3. The NOC was supplemented on December 1, 2004, and September 1, 2005.
4. An NOC application to modify the ORDER to identify additional pollutants was submitted on May 15, 2007. Additional pollutants include n-Nitrosodi-n-propylamine, n-Nitrosodi-n-butylamine, and n-Nitrosomethylethylamine. The application was found to be complete on May 25, 2007.
5. Hanford is an existing major stationary source that emits more than 250 tons of a regulated pollutant per year.
6. The proposed project consists of installing and operating tank ventilation exhaust systems within the single-shell tank (SST) farms to support retrieval of tank waste over a period of approximately 22 years.
7. The proposed project has been supplemented to include active ventilation of tanks 241-C-101 through 241-C-112 when these tanks are not undergoing retrieval.
8. The proposed project has been supplemented to include:
  - Stack aggregation and relocation of the 241-C tank farm exhaust point outside of the tank farm with increased stack height.
  - Use of supplementary dispersion air after the exhaust has undergone emissions control.

9. SST vessels within the scope include vessels in each of the 12 SST farms:

- 241-A (6 of 6 tanks)
- 241-BX (12 of 12 tanks)
- 241-S (10 of 12 tanks)
- 241-TX (18 of 18 tanks)
- 241-AX (4 of 4 tanks)
- 241-BY (12 of 12 tanks)
- 241-SX (15 of 15 tanks)
- 241-TY (6 of 6 tanks)
- 241-B (16 of 16 tanks)
- 241-C (16 of 16 tanks)
- 241-T (16 of 16 tanks)
- 241-U (15 of 16 tanks)

10. SST vessels outside the scope of this project are: 241-C-106 during retrieval, 241-S-102, 241-S-112, and 241-U-107.

11. Hanford is located in a Class II Area designated as “attainment” for the purpose of NOC permitting for all pollutants.

12. Emissions of criteria pollutants from the proposed project are below the Prevention of Significant Deterioration Significant Emission Rates.

13. Criteria air pollutant emissions from the proposed project are below the *de minimus* levels in WAC 173-400-110(5)(d).

14. Acceptable Source Impact Levels (ASILs) do not exist for the Toxic Air Pollutants (TAPs) propionaldehyde, acetophenone, carbonyl sulfide, n-Nitrosomorpholine, n-Nitrosomethylethylamine, and n-Nitrosodi-n-propylamine, which the proposed project may emit. Therefore, Ecology has developed Screening Levels for these pollutants as detailed in Table 1.

Table 1: Development of Screening Levels

Toxic Air Pollutant	Chemical Abstracts Service #	Screening Level [ $\mu\text{g}/\text{m}^3$ ]	Basis for Screening Level (S.L.)
Propionaldehyde	123-38-6	160 (24-hr average)	The current ACGIH Threshold Limit Value (TLV) for this material is 20 ppm (TWA). At 25°C and one atmosphere this TLV is 47,477.6 $\mu\text{g}/\text{m}^3$ . Application of WAC 173-460-110(2)(b) divides the TLV by 300 resulting in a value of 158.26 $\mu\text{g}/\text{m}^3$ (24 hr average). Assessment rounded to two significant digits.
Acetophenone	98-86-2	350 (24-hr average)	Applying, under WAC 173-460-110(3)(a), IRIS general toxicity data of this material with RfD of 100 $\mu\text{g}/\text{Kg}\cdot\text{day}$ , for average adult of 70 Kg weight and inhaled air of 20 $\text{m}^3$ , results in a value of: $S.L. = \frac{100\mu\text{g}}{\text{Kg}\cdot\text{day}} \cdot \frac{\text{day}}{20\text{m}^3\text{air}} \cdot 70\text{Kg} = \frac{350\mu\text{g}}{\text{m}^3} \text{ (24 hr average)}$
Carbonyl Sulfide	463-58-1	19 (24-hr average)	Applying, under WAC 173-460-110(3)(a), Toxics release toxicity data of this material with RfD of 5.5 $\mu\text{g}/\text{Kg}\cdot\text{day}$ , for average adult of 70 Kg weight and inhaled air of 20 $\text{m}^3$ , results in a value of: $S.L. = \frac{5.5\mu\text{g}}{\text{Kg}\cdot\text{day}} \cdot \frac{\text{day}}{20\text{m}^3\text{air}} \cdot 70\text{Kg} = \frac{19.3\mu\text{g}}{\text{m}^3} \text{ (24 hr average)}$ Assessment rounded to two significant digits.
n-Nitrosomorpholine	59-89-2	5.3E-04 (Annual average)	Unit cancer unit risk factor of 1.90E-03/ $\mu\text{g}/\text{m}^3$ with estimated continuous inhalation exposure resulting in excess lifetime cancer risk by 1/1,000,000 results in a value of: $S.L. = \frac{1}{1\text{E}+06} \Big/ \frac{1.9\text{E}-03\text{m}^3}{\mu\text{g}} = \frac{5.263\text{E}-04\mu\text{g}}{\text{m}^3} \text{ (Annual average)}$

Table 1: Development of Screening Levels

Toxic Air Pollutant	Chemical Abstracts Service #	Screening Level [ $\mu\text{g}/\text{m}^3$ ]	Basis for Screening Level (S.L.)
			Assessment rounded to two significant digits.
n-Nitrosomethylethyl amine	10595-95-6	1.6E-04 (Annual average)	Unit cancer unit risk factor of $6.3\text{E}-03/\mu\text{g}/\text{m}^3$ with estimated continuous inhalation exposure resulting in excess lifetime cancer risk by 1/1,000,000 results in a value of: $S.L. = \frac{1}{1\text{E} + 06} / \frac{6.3\text{E} - 03 \text{ m}^3}{\mu\text{g}} = \frac{1.587\text{E} - 04 \mu\text{g}}{\text{m}^3} \text{ (Annual average)}$ Assessment rounded to two significant digits.
n-Nitrosodi-n-propylamine	621-64-7	5 E-04 (Annual average)	Unit cancer unit risk factor of $2\text{E}-03/\mu\text{g}/\text{m}^3$ with estimated continuous inhalation exposure resulting in excess lifetime cancer risk by 1/1,000,000 results in a value of: $S.L. = \frac{1}{1\text{E} + 06} / \frac{2\text{E} - 03 \text{ m}^3}{\mu\text{g}} = \frac{5.0\text{E} - 04 \mu\text{g}}{\text{m}^3} \text{ (Annual average)}$ Assessment limited to one significant digit.

References:

- Propionaldehyde: ACGIH 2004, American Conference of Government Industrial Hygienists, 2004 TLVs<sup>®</sup> and BEIs<sup>®</sup>, Cincinnati, Ohio.
- Acetophenone: IRIS, Integrated Risk Information System, <http://www.epa.gov/iris/subst/0321.htm>
- Carbonyl Sulfide: Bouwes, N. and Hassur, S., *Toxics Release Inventory Relative Risk-Based Environmental Indicators: Interim Toxicity Weighting Summary Document*. Economics, Exposure and Technology Division Office of Pollution Prevention and Toxics, U.S. Environmental Protection Agency. 401 M St., SW Washington, D.C. 20460. June 1997. (<http://www.epa.gov/oppt/rsei/docs/toxwght97.pdf>).
- N-Nitrosomorpholine, n-Nitrosomethylethylamine, and n-Nitrosodi-n-propylamine: California Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database (TCDB). (<http://www.oehha.ca.gov/risk/ChemicalDB/index.asp>)

15. The proposed project has no chlorinated dibenzo-*p*-dioxin or chlorinated dibenzofuran ambient impacts based upon submittal and supplement of the NOC application.
16. TAPs from the proposed project are below the ASILs of WAC 173-460-150 and WAC 173-460-160 or Screening Levels of Table 1.
17. Toxics Best Available Control Technology (T-BACT) for this project has been determined to be operation of the tank ventilation exhauster systems with moisture de-entrainment, pre-heater, and High Efficiency Particulate Air (HEPA) filtration in service in the treatment train.
18. The proposed project, if constructed and operated as herein required, will provide T-BACT.
19. The proposed project, if operated as herein required, will be in accordance with applicable rules and regulations, as set forth in Chapter 173-400 WAC and Chapter 173-460 WAC, and the operation thereof will not result in ambient air quality standards being exceeded.
20. The project will have no significant impact on air quality.

**THEREFORE, IT IS ORDERED** that the project as described in said Notice of Construction application, and as detailed in emissions estimates and impact and control technology assessments submitted to the Washington State Department of Ecology in reference thereto, is approved for construction, installation, and operation, provided compliance with the conditions and restrictions described below. This ORDER shall be identified as NOC ORDER DE05NWP-002, Rev. 2.

## 1.0 GENERAL APPROVAL CONDITIONS

### 1.1 Effective Date

The effective date of this authorization shall be that as signed in Section 4.0. All references to procedures or test methods shall be to those in effect as of the effective date of this ORDER.

### 1.2 Emission Limits

- 1.2.1 Visible emissions from each tank ventilation exhauster stack or aggregated exhauster stack shall not exceed five percent.
- 1.2.2 Tank ventilation exhauster systems for the 241-C SST farm 100 series tanks (241-C-101 through 241-C-112) shall not exceed cumulative flow rates of 7,000 ft<sup>3</sup>/min (standard temperature and pressure) for three exhausters individually limited to 1,000 ft<sup>3</sup>/min, 3,000 ft<sup>3</sup>/min, and 3,000 ft<sup>3</sup>/min, respectively.
- 1.2.3 SST ventilation exhauster systems for the retrieval of wastes other than those of the 241-C tank farm 100 series tanks shall not exceed 1,000 ft<sup>3</sup>/min (standard temperature and pressure).
- 1.2.4 All TAPs, as submitted in the permittee's NOC Application, shall be below their respective ASIL or Screening Level of Table 1.

### 1.3 Compliance Demonstration

- 1.3.1 Compliance with Approval Condition 1.2.1 shall be met by Tier 3 Visible Emissions Survey requirements of the Hanford Air Operating Permit.
- 1.3.2 Should visible emissions be observed which are not solely attributable to water condensation, compliance with Approval Condition 1.2.1 shall be met by performing an opacity determination utilizing 40 Code of Federal Regulations (CFR) Part 60, Appendix A, Method 9, providing that such determination shall not place the visible emission observer in hazard greater than that identified for the general worker.
- 1.3.3 Compliance with Approval Condition 1.2.2 shall be demonstrated by stack gas flow and temperature measurement.
- 1.3.4 Compliance with Approval Condition 1.2.3 shall be demonstrated by stack gas flow and temperature measurement.
- 1.3.5 Compliance with Approval Condition 1.2.4 shall be met by:

1.3.5.1 Operating the exhauster systems only when in accord with T-BACT emission controls found for this project.

1.3.5.2 Development and implementation of a sampling and analysis plan (SAP) for each tank retrieval. For each retrieval, the SAP shall address the emission of a minimum of the three TAPs with the highest potential ambient concentration relative to their ASILs of WAC 173-460-150 and WAC 173-460-160 or relative to their Screening Level of Table 1, above. The TAPs addressed in the SAP shall be identified from Table 2 and based upon best engineering judgment and most current tank content data. Analytical methods for the analyses shall be the United States Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), or National Institute for Occupational Safety and Health (NIOSH) approved, or by approved equivalent method.

#### 1.4 Manuals

Existing Operations and Maintenance (O&M) manuals for all equipment, procedures, and controls associated with the proposed activities that have the potential to affect emissions to the atmosphere shall be followed. Manufacturer's instructions may be referenced. The O&M manuals shall be updated to reflect any modifications of the process or operating procedures. Copies of the O&M manuals shall be available to Ecology upon request.

## 2.0 Notifications and Submittals

### 2.1 Addressing

Any required notifications and submittals required under these Approval Conditions shall be sent to:

Washington State Department of Ecology  
Nuclear Waste Program  
3100 Port of Benton Boulevard  
Richland, Washington 99354

### 2.2 Schedule

A schedule of installation and operation activities for these exhauster systems shall be submitted within 30 days of original issuance of this ORDER with a duration extending to 12 months after the effective date of this ORDER.

### 3.0 Notifications and Submittals

#### 3.1 Addressing

Any required notifications and submittals required under these Approval Conditions shall be sent to:

Washington State Department of Ecology  
Nuclear Waste Program  
3100 Port of Benton Boulevard  
Richland, Washington 99354

#### 3.2 Schedule

A schedule of installation and operation activities for these exhauster systems shall be submitted within 30 days of original issuance of this ORDER with a duration extending to 12 months after the effective date of this ORDER.

#### 3.3 Operational Notice

Notification shall be made at least 10 days prior to initial operation of any exhauster system covered by this ORDER when installed to ventilate a tank not previously actively ventilated under this ORDER.

#### 3.4 Recordkeeping

Specific records shall be kept on the Hanford Site by the permittee and made available for inspection by Ecology upon request. The records shall be organized in a readily accessible manner and cover a minimum of the most recent 60-month period. The records to be kept shall include the following:

1. Records of calibration of stack gas flow rate and temperature measurement devices.
2. Exhauster system stack flow rates and temperatures records.
3. All monitoring and operations records required to operate and maintain the emission control equipment which implements T-BACT as described in Section 1.0.
4. SAPs developed for compliance demonstration as described in Section 1.3.5.2.
5. Laboratory analysis result summaries of any samples undertaken after the effective date of this ORDER from SST tank farm tank headspaces or single-shell tank ventilation system exhaust which are examined for organic species or other TAPs.

### 3.5 Reporting

Visible emission surveys, conducted pursuant to Compliance Demonstration requirement 1.3.2, shall be submitted to Ecology within 30 days of completion of the survey with an assessment of the cause of visible emissions and a report of the maintenance conducted to maintain the subject exhaust system's T-BACT operations.

Identification of any TAP not previously identified within the NOC Application or Supplement emissions estimates as defined in Table 2 shall be submitted to Ecology within 90 days of completion of laboratory analyses which verify emissions of that toxic air pollutant from the project.

An annual schedule (Federal fiscal year basis) of anticipated operations and installations of exhaust systems under this ORDER shall be submitted by November first of each year following issuance of this ORDER.

### 4.0 APPROVAL ORDER AND RESTRICTIONS

Operation of the subject tank ventilation systems is intended for the storage and retrieval of waste contained in the tanks as described in the NOC application and supplement.

This Authorization may be modified, suspended, or revoked in whole, or in part, for cause including, but not limited to, the following:

1. Violating any terms or conditions of this authorization.
2. Obtaining this authorization by misrepresentation, or failure to fully disclose all relevant facts.

The provisions of this authorization are severable. If any provision of this authorization or application of any provisions of this authorization to any circumstance is held invalid, the application of such provision to their circumstances and the remainder of this authorization shall not be affected.

Any person aggrieved by this ORDER may obtain review thereof by application, within 30 days of receipt of this ORDER to:

Pollution Control Hearings Board  
P.O. Box 40903  
Olympia, Washington 98504-0903

Concurrently, copies of the application must be sent to:

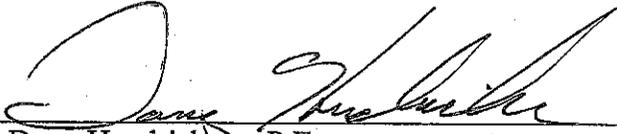
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, Washington 98504-7600

Washington State Department of Ecology  
3100 Port of Benton Boulevard  
Richland, Washington 99354

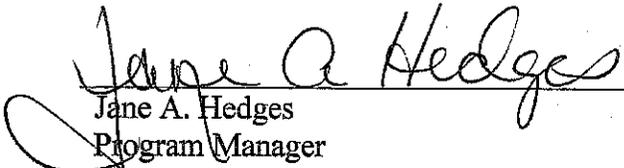
These procedures are consistent with the provisions of Chapter 43.21B RCW, and the rules and regulations adopted thereunder.

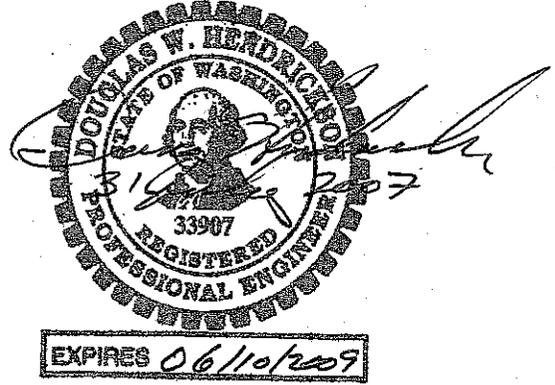
DATED at Richland, Washington, this 31<sup>st</sup> day of July 2007.

REVIEWED AND PREPARED BY:

  
\_\_\_\_\_  
Doug Hendrickson, P.E.

APPROVED BY:

  
\_\_\_\_\_  
Jane A. Hedges  
Program Manager  
Nuclear Waste Program



**Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate**

NOC DE05NWP-002 Rev 2.				Retrieval Emissions				Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP-002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
n-Nitrosomethylethylamine	10595-95-6	A	0.00016			2.2E-06	1.9E-02	6.6E-04	2.0E-02
1,4-Dichlorobenzene	106-46-7	A	1.5	500	3.0E-05	1.0E-06	2.7E-01	3.6E-04	2.7E-01
Ethylene dibromide (dibromomethane)	106-93-4	A	0.0045	0.5	4.2E-05	9.2E-06	4.5E-01	3.2E-03	4.5E-01
1,3-Butadiene	106-99-0	A	0.0036	0.5	1.8E-04	1.1E-03	1.1E+01	3.8E-01	1.2E+01
1,2-Dichloroethane (ethylene chloride)	107-06-2	A	0.038	10	2.0E-05	2.1E-04	2.0E+00	7.0E-02	2.0E+00
Acrylonitrile	107-13-1	A	0.015	10	6.5E-07		5.7E-03		5.7E-03
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	A	2.5	500	5.4E-07	2.5E-06	2.7E-02	8.8E-04	2.8E-02
1,4-Dioxane	123-91-1	A	0.032	10	2.0E-05	2.6E-04	2.5E+00	9.0E-02	2.6E+00
Perchloroethylene (tetrachloroethylene)	127-18-4	A	1.1	500	3.1E-04	5.4E-04	7.4E+00	1.9E-01	7.6E+00
Polychlorinated biphenyls (PCBs)	1336-36-3	A	0.0045	0.5	1.6E-05		1.4E-01		1.4E-01
Formaldehyde	50-00-0	A	0.077	20		4.3E-04	3.8E+00	1.5E-01	4.0E+00
Carbon tetrachloride	56-23-5	A	0.067	20	9.3E-04	5.9E-04	1.3E+01	2.1E-01	1.4E+01
n-Nitrosomorpholine	59-89-2	A	0.00053		5.3E-06		4.6E-02		4.6E-02
n-Nitrosodi-n-propylamine	621-64-7	A	0.0005			4.1E-07	3.6E-03	1.3E-04	3.7E-03
n-Nitrosodimethylamine	62-75-9	A	0.000071		1.8E-04		1.6E+00		1.6E+00
Chloroform	67-66-3	A	0.043	10	6.1E-05	4.9E-04	4.8E+00	1.7E-01	5.0E+00
Benzene	71-43-2	A	0.12	20	1.4E-03	2.5E-03	3.4E+01	8.6E-01	3.5E+01
Cadmium and compounds	7440-43-9	A	0.00056			7.3E-06	6.4E-02	2.5E-03	6.7E-02
Vinyl chloride	75-01-4	A	0.012	10	1.4E-05	2.5E-04	2.3E+00	8.8E-02	2.4E+00
Acetaldehyde	75-07-0	A	0.45	50	5.6E-04	1.9E-04	6.6E+00	6.7E+00	1.3E+01

**Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate**

NOC DE05NWP-002 Rev 2.					Retrieval Emissions			Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP- 002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
Dichloromethane (methylene chloride)	75-09-2	A	0.56	50	2.4E-03	9.8E-02	8.8E+02	3.4E+01	9.2E+02
Ethylene oxide	75-21-8	A	0.01	10	5.5E-06		4.8E-02		4.8E-02
1,2-Dichloropropane	78-87-5	A	4	0.02	1.6E-05		1.4E-01		1.4E-01
Trichloroethylene	79-01-6	A	0.59	50	8.8E-05	4.1E-04	4.4E+00	1.4E-01	4.5E+00
n-Nitrosodi-n-butylamine	924-16-3	A	0.00063			7.1E-06	6.2E-02	2.2E-03	6.4E-02
Arsenic and inorganic arsenic compounds	C7440-38-2	A	0.00023			2.4E-05	2.1E-01	8.4E-03	2.2E-01
p-Nitrochlorobenzene	100-00-5	B	2	0.02	5.8E-07	2.7E-06	2.9E-02	9.0E-04	3.0E-02
Ethyl benzene	100-41-4	B	1000	5	3.1E-04	8.1E-04	9.8E+00	2.9E-01	1.0E+01
Styrene	100-42-5	B	1000	5	2.9E-04	1.3E-03	1.4E+01	4.4E-01	1.4E+01
Nitric oxide	10102-43-9	B	100	2	2.1E-03	4.8E-03	6.0E+01	1.7E+00	6.2E+01
Phenyl ether	101-84-8	B	23	0.2	2.0E-05		1.8E-01		1.8E-01
Ethyl butyl ketone	106-35-4	B	780	5	1.4E-03	9.0E-03	9.1E+01	3.2E+00	9.4E+01
1,2-Epoxybutane	106-88-7	B	20	0.2	2.9E-05		2.5E-01		2.5E-01
Butane	106-97-8	B	6300	5	5.6E-03	3.4E-02	3.5E+02	1.2E+01	3.6E+02
Acrolein	107-02-8	B	0.02	0.02	1.7E-06		1.5E-02		1.5E-02
Allyl chloride	107-05-1	B	1	0.02	3.6E-06		3.2E-02		3.2E-02
Allyl alcohol	107-18-6	B	17	0.2	1.1E-06		9.6E-03		9.6E-03
Methyl formate	107-31-3	B	820	5	2.1E-07	3.3E-05	2.9E-01	1.2E-02	3.0E-01
Methyl propyl ketone	107-87-9	B	2300	5	1.7E-03	5.5E-03	6.3E+01	1.9E+00	6.5E+01
1-Nitropropane	108-03-2	B	20	0.2	1.7E-05		1.5E-01		1.5E-01
Vinyl acetate	108-05-4	B	200	2.6	3.1E-07		2.7E-03		2.7E-03
Methyl isobutyl ketone (MIBK)	108-10-1	B	680	5	9.3E-04	2.9E-03	3.3E+01	9.9E-01	3.4E+01
Isopropyl ether	108-20-3	B	3500	5	4.7E-05		4.1E-01		4.1E-01
Methylcyclohexane	108-87-2	B	5400	5	1.1E-03	6.2E-04	1.5E+01	2.2E-01	1.5E+01
Toluene	108-88-3	B	400	5	3.1E-03	4.1E-03	6.3E+01	1.4E+00	6.5E+01
Chlorobenzene	108-90-7	B	150	2.6	2.8E-05	3.3E-04	3.1E+00	1.2E-01	3.3E+00

Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate

NOC DE05NWP-002 Rev 2.				Retrieval Emissions				Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP-002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
Cyclohexanol	108-93-0	B	690	5	2.3E-07		2.0E-03		2.0E-03
Cyclohexanone	108-94-1	B	330	5	2.2E-04	5.3E-04	6.5E+00	1.8E-01	6.7E+00
Phenol	108-95-2	B	63	1.2	3.0E-05	1.1E-03	1.0E+01	3.9E-01	1.0E+01
Pentane	109-66-0	B	6000	5	2.9E-03	5.0E-03	6.9E+01	1.8E+00	7.1E+01
Tetrahydrofuran	109-99-9	B	2000	5	4.4E-03	2.2E-02	2.3E+02	7.7E+00	2.4E+02
Methyl isoamyl ketone	110-12-3	B	780	5	5.8E-05	9.7E-05	1.4E+00	3.4E-02	1.4E+00
Methyl n-amyl ketone	110-43-0	B	780	5	9.0E-04	3.9E-03	4.2E+01	1.3E+00	4.3E+01
Hexane (n-Hexane)	110-54-3	B	200	2.6		8.8E-03	7.7E+01	3.1E+00	8.0E+01
n-Valeraldehyde	110-62-3	B	590	5	3.7E-04	1.0E-03	1.2E+01	3.6E-01	1.3E+01
Cyclohexane	110-82-7	B	3400	5	7.7E-04	2.3E-03	2.7E+01	8.0E-01	2.8E+01
Cyclohexene	110-83-8	B	3400	5	1.1E-06		9.6E-03		9.6E-03
Pyridine	110-86-1	B	53	0.6	2.9E-04	2.4E-04	4.6E+00	8.2E-01	5.5E+00
Octane	111-65-9	B	4700	5	9.6E-04	3.7E-03	4.0E+01	1.3E+00	4.2E+01
2-Butoxyethanol	111-76-2	B	400	5	1.1E-04	1.5E-06	9.8E-01	5.3E-04	9.8E-01
Nonane	111-84-2	B	3500	5	7.6E-04	3.2E-03	3.5E+01	1.1E+00	3.6E+01
1,2,4-Trichlorobenzene	120-82-1	B	120	2	3.6E-05	3.7E-04	3.5E+00	1.3E-01	3.6E+00
Diphenylamine	122-39-4	B	33	0.6	3.8E-05	1.5E-05	4.6E-01	5.3E-03	4.7E-01
Dipropyl ketone	123-19-3	B	780	5	3.2E-04	1.4E-03	1.5E+01	5.0E-01	1.5E+01
Propionaldehyde	123-38-6	B	160		1.1E-04	7.2E-04	7.3E+00	2.5E-01	7.5E+00
Isoamyl alcohol	123-51-3	B	1200	5	1.3E-05		1.1E-01		1.1E-01
n-Butyl acetate	123-86-4	B	2400	5	1.9E-03	1.3E-02	1.3E+02	4.2E+00	1.3E+02
Dimethylamine	124-40-3	B	60	1.2		1.0E-03	8.9E+00	3.5E-01	9.3E+00
Tributyl phosphate	126-73-8	B	7.3	0.02	1.9E-03	3.7E-03	4.9E+01	1.3E+00	5.0E+01
Methylacrylonitrile	126-98-7	B	9	0.02	1.2E-05	5.6E-05	6.0E-01	2.0E-02	6.1E-01
Dimethyl acetamide	127-19-5	B	120	2	5.4E-06	5.0E-03	4.4E+01	1.8E+00	4.6E+01
2,6-Ditert. butyl-p-cresol	128-37-0	B	33	0.6	5.5E-04	4.2E-03	4.2E+01	1.4E+00	4.3E+01
Xylenes (m-,o-,p-isomers)	1330-20-7	B	1500	5	1.7E-04	7.9E-04	8.4E+00	2.8E-01	8.7E+00
Ethyl acetate	141-78-6	B	4800	5	5.2E-03	5.3E-02	5.1E+02	1.8E+01	5.2E+02

**Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate**

NOC DE05NWP-002 Rev 2.				Retrieval Emissions				Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP- 002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
Mesityl oxide	141-79-7	B	200	2.6	1.5E-05		1.3E-01		1.3E-01
Heptane (n-Heptane)	142-82-5	B	5500	5	2.4E-03	5.0E-03	6.5E+01	1.7E+00	6.7E+01
Cyclopentane	287-92-3	B	5700	5	1.2E-04	1.6E-05	1.2E+00	5.7E-03	1.2E+00
Crotonaldehyde	4170-30-3	B	20	0.2	2.4E-05	7.3E-03	6.4E+01	2.5E+00	6.7E+01
Carbonyl sulfide	463-58-1	B	19		1.0E-05		8.8E-02		8.8E-02
Ethyl amyl ketone	541-85-5	B	440	5		1.3E-04	1.1E+00	4.3E-02	1.1E+00
Methyl isopropyl ketone	563-80-4	B	2300	5	8.8E-04	4.0E-03	4.3E+01	1.3E+00	4.4E+01
Cyanides, as CN	57-12-5	B	17	0.2	6.2E-03	6.2E-02	5.9E+02	2.2E+01	6.2E+02
1,1-Dimethylhydrazine	57-14-7	B	4	0.02	1.2E-06	3.5E-04	3.1E+00	1.3E-01	3.2E+00
2-Hexanone (MBK)	591-78-6	B	67	1.2	8.5E-04	3.2E-03	3.5E+01	1.2E+00	3.7E+01
Methyl hydrazine	60-34-4	B	1.2	0.02	2.9E-07		2.5E-03		2.5E-03
Methyl isocyanate	624-83-9	B	0.16	0.02	4.8E-06		4.2E-02		4.2E-02
n-Propyl nitrate	627-13-4	B	360	5	3.0E-04	9.9E-03	9.0E+01	3.5E+00	9.3E+01
Ethyl alcohol	64-17-5	B	6300	5	5.9E-03	1.0E-02	1.4E+02	3.5E+00	1.4E+02
Acetic acid	64-19-7	B	83	1.2	2.4E-04	5.0E-02	4.4E+02	1.8E+01	4.6E+02
Methyl alcohol	67-56-1	B	870	5	8.5E-03	3.4E-02	3.7E+02	1.2E+01	3.9E+02
Isopropyl alcohol	67-63-0	B	3300	5	2.0E-03	1.3E-03	2.9E+01	4.4E-01	2.9E+01
Acetone	67-64-1	B	5900	5	2.6E-02	5.5E-02	7.1E+02	1.9E+01	7.3E+02
n-Propyl alcohol	71-23-8	B	1600	5	2.6E-03	1.0E-02	1.1E+02	3.7E+00	1.2E+02
n-Butyl alcohol	71-36-3	B	500	5	5.8E-02	1.7E-01	2.0E+03	5.9E+01	2.1E+03
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	B	6400	5	5.7E-05	3.2E-04	3.3E+00	1.2E-01	3.4E+00
Silver, Metal	7440-22-4	B	0.33	0.02		1.0E-05	8.8E-02	3.5E-03	9.2E-02
Tin, Metal	7440-31-5	B	6.7	0.02		7.0E-04	6.1E+00	2.4E-01	6.3E+00
Chromium (metal)	7440-47-3	B	1.7	0.02		4.8E-04	4.2E+00	1.7E-01	4.4E+00
Methyl bromide	74-83-9	B	5	0.02	2.4E-05	1.5E-05	3.4E-01	5.0E-03	3.5E-01
Methyl chloride	74-87-3	B	340	5	9.2E-05	2.3E-04	2.8E+00	1.0E-01	2.9E+00
Methylamine	74-89-5	B	43	0.6		7.0E-04	6.1E+00	2.4E-01	6.3E+00

**Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate**

NOC DE05NWP-002 Rev 2.				Retrieval Emissions				Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP- 002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
Methyl acetylene	74-99-7	B	5500	5	1.5E-04	7.9E-04	8.2E+00	2.8E-01	8.5E+00
Ethyl chloride	75-00-3	B	10000	5	4.0E-05	2.3E-04	2.4E+00	8.1E-02	2.4E+00
Ethylamine	75-04-7	B	60	1.2		5.0E-05	4.4E-01	1.7E-02	4.6E-01
Acetonitrile	75-05-8	B	220	2.6	6.0E-03	2.7E-02	2.9E+02	9.0E+00	3.0E+02
Formamide	75-12-7	B	60	1.2	9.1E-07		8.0E-03		8.0E-03
Carbon disulfide	75-15-0	B	100	2	3.2E-04	1.4E-03	1.5E+01	4.8E-01	1.5E+01
1,1-Dichloroethane	75-34-3	B	2700	5	2.3E-05		2.0E-01		2.0E-01
Vinylidene chloride	75-35-4	B	67	1.2	5.8E-05	4.1E-04	4.1E+00	1.4E-01	4.3E+00
Dichlorofluoromethane	75-43-4	B	130	2.6	5.2E-05	4.2E-05	8.3E-01	1.4E-02	8.4E-01
Chlorodifluoromethane	75-45-6	B	12000	5	8.4E-04	4.8E-05	7.8E+00	1.7E-02	7.8E+00
Trimethylamine	75-50-3	B	80	1.2	1.8E-04	6.7E-02	5.9E+02	2.3E+01	6.1E+02
Nitromethane	75-52-5	B	830	5	1.6E-05		1.4E-01		1.4E-01
Propylene imine	75-55-8	B	16	0.2	6.7E-06		5.9E-02		5.9E-02
tert-Butyl alcohol	75-65-0	B	1000	5	2.4E-04	1.1E-04	3.1E+00	4.0E-02	3.1E+00
Trichlorofluoromethane	75-69-4	B	19000	5	3.1E-02	6.8E-03	3.3E+02	2.3E+00	3.3E+02
Dichlorodifluoromethane	75-71-8	B	16000	5	1.4E-04	7.3E-04	7.6E+00	2.5E-01	7.9E+00
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	B	27000	5	3.3E-04	7.4E-04	9.4E+00	2.6E-01	9.7E+00
Dichlorotetrafluoroethane	76-14-2	B	23000	5	5.3E-05	2.7E-05	7.0E-01	9.0E-04	7.1E-01
Ammonia	7664-41-7	B	100	2	1.5E+00	1.1E+00	2.3E+04	4.0E+02	2.4E+04
Isobutyl alcohol	78-83-1	B	510	5	1.2E-05		1.1E-01		1.1E-01
sec-Butyl alcohol	78-92-2	B	1000	5	1.5E-04	4.5E-04	5.2E+00	1.5E-01	5.4E+00
Methyl ethyl ketone (MEK)	78-93-3	B	1000	5	7.4E-03	6.6E-02	6.4E+02	2.3E+01	6.7E+02
1,1,2-Trichloroethane	79-00-5	B	180	2.6	8.4E-05	2.7E-04	3.1E+00	9.9E-02	3.2E+00
Propionic acid	79-09-4	B	100	2	3.8E-06	8.6E-06	1.1E-01	3.0E-03	1.1E-01
Acrylic acid	79-10-7	B	0.3	0.02	4.7E-04	2.2E-03	2.3E+01	7.7E-01	2.4E+01
Methyl acetate	79-20-9	B	2000	5	1.8E-05		1.6E-01		1.6E-01
1,1,2,2-Tetrachloroethane	79-34-5	B	23	0.2	5.4E-05	4.9E-04	4.8E+00	1.7E-01	4.9E+00

**Table 2: Hanford Single Shell Tank Categorical Retrieval Toxic Air Pollutant Emissions Estimate**

NOC DE05NWP-002 Rev 2.					Retrieval Emissions			Non-Retrieval Emissions	Total Emissions
Material Data			ASIL/ Screening Level <sup>1</sup>	SQER <sup>2</sup>	SST Base <sup>3</sup>	C-Farm with Stack Relocation <sup>4</sup>	Total	C-Farm with Stack Relocation <sup>4</sup>	DE05NWP- 002, Rev. 1
Chemical Name	CAS <sup>5</sup>	Class	µg/m <sup>3</sup>	lb/period	lb/hr	lb/hr	lb/yr	lb/yr	lb/yr
Diethyl phthalate	84-66-2	B	17	0.2	1.6E-04	4.7E-06	1.4E+00	1.6E-03	1.4E+00
Dibutyl phthalate	84-74-2	B	17	0.2	1.3E-06	3.1E-06	3.8E-02	1.1E-03	3.9E-02
Hexachlorobutadiene	87-68-3	B	0.7	0.02	4.1E-05	5.3E-04	5.0E+00	1.9E-01	5.1E+00
Naphthalene	91-20-3	B	170	2.6	9.1E-06	1.5E-06	9.3E-02	5.3E-04	9.3E-02
Biphenyl	92-52-4	B	4.3	0.02	2.0E-03	9.5E-03	1.0E+02	3.3E+00	1.0E+02
o-Dichlorobenzene (1,2-Dichlorobenzene)	95-50-1	B	1000	5	2.3E-05	1.1E-06	2.1E-01	4.1E-04	2.1E-01
Diethyl ketone	96-22-0	B	2300	5	8.1E-06	2.3E-04	2.1E+00	8.2E-02	2.2E+00
Cumene	98-82-8	B	820	5	5.4E-05	2.5E-04	2.7E+00	8.9E-02	2.8E+00
a-Methyl styrene	98-83-9	B	810	5	2.1E-06	2.5E-06	4.0E-02	8.8E-04	4.1E-02
Acetophenone	98-86-2	B	350		2.8E-04	1.9E-03	1.9E+01	6.7E-01	2.0E+01
Nitrobenzene	98-95-3	B	1.7	0.02	2.0E-06		1.8E-02		1.8E-02
Mercury, Aryl & inorganic compd	C7439-97-6	B	0.33	0.02		1.3E-04	1.1E+00	4.6E-02	1.1E+00
Antimony & compounds as Sb	C7440-36-0	B	1.7	0.02		4.3E-06	3.8E-02	1.5E-03	4.0E-02
Barium, soluble compounds Ba	C7440-39-3	B	1.7	0.02		1.4E-04	1.2E+00	5.0E-02	1.2E+00
Selenium compounds, as Se	C7782-49-2	B	0.67	0.02		5.7E-05	5.0E-01	2.0E-02	5.2E-01
Total					1.7	2.1	33,010	731	33,741

- Notes:
- 1: ASILS for materials identified in Table 1 do not exist within WAC 173-460-150 or WAC 173-460-160. Table 1 establishes Screening Levels to be applied. Periods of exposure assessment are Annual for "A" TAPs and 24 hours for "B" TAPs.
  - 2: Small quantity emission rate (SQER) periods are Annual for "A" TAPs and per hour for "B" TAPs. "A" TAP 1,2-Dichloropropane is treated with "B" class periods. SQER values for Table 1 materials do not exist within WAC 173-460-080.
  - 3: Single-Shell Tank Retrieval NOC Application of July 22, 2004.
  - 4: C-Farm Stack Relocation NOV Modification Application of September 1, 2005, and as modified May 15, 2007
  - 5: CAS = Chemical Abstracts Service registry number.