

ENVIRONMENTAL CALCULATION COVER PAGE

Section 1: Completed by the Responsible Manager

Project: Soil and Groundwater Remediation Project

Date: 5/17/2017

Calculation Title & Description: Evaluate 216-A-36B Dangerous Waste Designation

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Jun 08, 2017



Section 2: Completed by Preparer

Calculation No.: ECF-200E-17-0002

Revision No.: 1

Revision History

Revision No.	Description	Date	Affected Pages	ADD ROW
1	Added quantities discharged on 8/30/1987 and 9/7/1987	4/25/2017	ALL	<input type="checkbox"/>
				<input checked="" type="checkbox"/>

Section 3: Completed by the Responsible Manager

Document Control:

Is the document intended to be controlled within the Document Management Control System (DMCS)? Yes No

Does document contain scientific and technical information intended for public use? Yes No

Does document contain controlled-use information? Yes No

Section 4: Document Review & Approval

LD Habel/Engineer Preparer:	Name /Position	<i>[Signature]</i> Signature	5/18/17 Date
PA Ruck/Engineer Checker:	Name /Position	<i>[Signature]</i> Signature	5/20/17 Date
WE Toebe/Engineer Senior Reviewer:	Name /Position	<i>[Signature]</i> Signature	5/22/17 Date
KA Iverson/200EAL Project Lead Responsible Manager:	Name /Position	<i>[Signature]</i> Signature	5/25/17 Date

Section 5: Applicable if calculation is a risk assessment or uses an environmental model

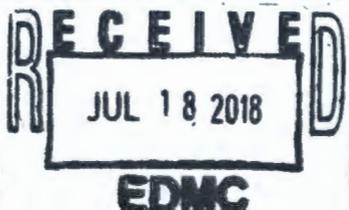
PRIOR TO INITIATING MODELING:

Required training for modelers completed:

Integration Lead Safety Software Approved:	Name /Position	Signature	Date
Integration Lead	Name /Position	Signature	Date

CALCULATION APPROVED:

Risk/Modeling Integration Manager:	Name /Position	Signature	Date
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Purpose: Evaluate the designation of 216-A-36B Crib as a Treatment, Storage, and Disposal Unit and identify the applicable dangerous waste numbers.

Background: A RCRA Part A permit application was submitted to the Washington Department of Ecology on February 2, 1988 as a protective filing recognizing that the applicability of RCRA on the Hanford Site was in dispute. The basis for this filing was that it contained concentrations of ammonium hydroxide in excess of 1% by weight making it a toxic state-only (WT02) dangerous waste.

Methodology: The waste management unit designation evaluation was performed by first determining whether or not the waste was discharged on or after the effective date for mixed waste regulation in Washington. The next step was to determine if the discharged material was a solid waste. If the material was deemed to be a solid waste it was then evaluated to determine whether or not it was a Dangerous Waste (DW) or an Extremely Hazardous Waste (EHW) according to the procedures provided in WAC 173-303-070. The process for making this determination is identified in the steps below.

1. RCRA Applicability Determination
 - o Determine what (if any) waste was discharged to the ditch on or after the effective date of the RCRA regulation (November 19, 1980).
2. Mixed Waste Applicability Determination
 - o Determine what (if any) radioactive waste was discharged to the crib on or after the effective date of the mixed waste regulation in Washington (August 19, 1987). If the waste is radioactive and received prior to August 19, 1987 exit the process here.
3. Solid Waste Determination
 - o Determine whether the material was a solid waste according to WAC 173-303-016. If the material is not considered a solid waste exit the process here, otherwise proceed to step 4.
4. Federal Hazardous Waste Determination
 - o First, determine if the waste is a listed discarded chemical product, WAC 173-303-081;
 - o Second, determine if the waste is a listed dangerous waste source, WAC 173-303-082;
 - o Third, if the waste is not listed in WAC 173-303-081 or 173-082, or for purposes of compliance with the federal land disposal restrictions as adopted by reference in WAC 173-303-140, determine if the waste exhibits any dangerous waste characteristic, WAC 173-303-090; and
 - o Stop here if one of the previous steps determined that the material should be designated as a dangerous waste. Otherwise proceed to step 5.
5. State-only Dangerous Waste Determination
 - o Fourth, if the waste is not listed in WAC 173-303-81 or 173-303-090, determine if the waste meets any dangerous waste criteria, WAC 173-303-100.

Assumptions and Inputs: The history of the waste management unit is presented below. It includes a list of the waste streams and dates discharged to the unit. The influent to the unit is evaluated according to the steps in the methodology section above. The findings are summarized and presented with the waste management unit designation in the results/conclusion section.

Software Applications: None

Calculations:**A) Waste Management Unit History**

The 216-A-36B Crib was constructed to replace 216-A-36A for disposal of ammonia scrubber condensate (ASD). It began receiving waste in March 1966 (ISO-698). The only contributor to the waste stream was condensate from the E-F11 Concentrator.

The E-F11 Concentrator was fed by the four ammonia scrubber catch tanks, Tk-A3-4, Tk-B3-4, Tk-C3-4, and Tk-E3-2. In addition to water from the dissolver ammonia scrubbers, the first three catch tanks also collect ammonia-rich condensate from the A, B, and C dissolver condensers. The liquid collected by the four catch tanks consists of raw water, condensate, radionuclides, and up to slightly over 2.5% weight percent ammonium hydroxide (WHC-EP-0342 Addendum 14).

All discharges to the 216-A-36B crib were discontinued in November 1987 by physically isolating it from the system (12214-88-005). All subsequent ammonia scrubber effluent was transferred to underground storage tanks.

The physical isolation included installing pancake blanks upstream of the ASD flow meter, downstream of the flow meter by-pass valve and in the sump and sampler/monitor return lines. The ammonia scrubber waste discharge pump jumper was removed and the associated nozzle was blanked. All other flows were re-routed to storage tank Tk-F12 for eventual transfer to underground storage (12214-88-005).

B) Assumptions:

- 1) The only significant discharges to the 216-A-36B crib between August 19, 1987 and November 1987 were two incidental releases of Ammonia as follows (p. A.6-13, WHC-EP-0287):
 - i) 772 lb of Ammonia on 8/30/1987
 - ii) 62 lb of Ammonia on 9/7/1987
- 2) The volume of waste discharged to the 216-A-36B crib were as follows (p. A.6-6, WHC-EP-0287):
 - i) 6.42×10^6 Liters total in August 1987
 - ii) 5.38×10^6 Liters total in September 1987
- 3) For purposes of calculating the concentration of waste discharged, assume that the release occurred over a 24 hour period and that the total volume of waste discharged during that time period was the average daily flow for the month.
- 4) The concentration of ammonia discharged during each event were as follows:
 - i) Ammonia concentration on 8/30/1987 = $772 \text{ lb} \times (1 \text{ Kg} \div 2.2 \text{ lb}) \times (1 \times 10^6 \text{ mg} \div 1 \text{ Kg}) \div (6.42 \times 10^6 \text{ L} \div 31 \text{ days}) = 1,694 \text{ mg/L}$.
 - ii) Ammonia concentration on 9/7/1987 = $62 \text{ lb} \times (1 \text{ Kg} \div 2.2 \text{ lb}) \times (1 \times 10^6 \text{ mg} \div 1 \text{ Kg}) \div (5.38 \times 10^6 \text{ L} \div 30 \text{ days}) = 157 \text{ mg/L}$.

C) RCRA Applicability Determination

- 1) The 216A-36B Crib continued to receive the ASD waste until November 1987.

D) Mixed Waste Applicability Determination

- 1) The ASD waste stream was radioactively contaminated.
- 2) The mixed waste regulations apply to the ASD waste.
- 3) The ASD waste stream continued to be discharged to 216-A-36B after August 19, 1987.

REV. 1
5/22/2017

E) Solid Waste Determination

- 1) The material is a solid waste since it was discarded and was not excluded by WAC 173-303-017(2).

F) Federal Hazardous Waste Determination

- 1) The material does not satisfy the definition of a commercial chemical product per WAC 173-303-040.
- 2) The waste is not listed nor is it a residue from the management of a waste listed on the dangerous waste sources list in WAC 173-303-9904.
- 3) The waste does not exhibit a dangerous waste characteristic under WAC 173-303-090.

G) State-only Dangerous Waste Determination

Ammonia, CAS No. 7664-41-7, in its pure form is toxic Category B (for fish toxicity) according to available data. This chemical is toxic Category B under the toxicity criteria of WAC 173-303-100(5). The equivalent concentration (E.C.) for this chemical in the waste matrix is calculated as follows:

i) Inputs:

- (1) Fish LC50 = 0.45 mg/L (Salmon; HSDB)
- (2) Rat (oral) LD50 = 350 mg/kg (HSDB)
- (3) Rat (inhalation) LC50 = 48.4 mg/L (HSDB)
- (4) Rabbit (dermal) LD50 = Not Available

ii) Calculation:

- (1) Ammonia concentration = 1,694 mg/L
- (2) Ammonia concentration % = $1,694 \text{ mg/L} \div (1 \text{ Kg/L} \times 1 \times 10^6 \text{ mg/Kg}) \times 100 = 0.169\%$

iii) E.C. (%) = toxic B constituent %/100 (WAC 173-303-100(5)(b)(ii))

- (1) E.C. (%) = 0.169/100
- (2) E.C. (%) = 0.00169

Results/Conclusions:

The ASD waste was a mixed waste exempt from RCRA regulations until August 19, 1987. The incidental release of 772 pounds of Ammonia to the 216-A-36B Crib on August 30, 1987 resulted in a calculated E.C. that exceeded the current regulatory threshold of 0.001% in WAC 173-303-100(5)(b)(iii)(A).

The 216-A-36B Crib should therefore be designated as a TSD unit. The only applicable dangerous waste code for 216-A-36B remains WT02.

References:

1. 12214-88-005, Rev. 1, 1988, *Closure of Ammonia Scrubber Distillate Crib 216-A-36B*, Westinghouse Hanford Company, Richland, Washington. Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0072356H>
2. Hazardous Substances Data Bank (HSDB) - TOXNET, accessed at <https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> on 4/24/2017.

REV. 1
5/22/2017

3. ISO-698, 1967, *Radioactive Contamination in Liquid Wastes Discharged to Ground at the Separations Facilities through December 1966*, Isochem, Richland, Washington. Available at: <https://www.osti.gov/scitech/servlets/purl/10131724>
4. WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia Washington.
5. WHC-EP-0287, 1989, *Waste Stream Characterization Report*, Westinghouse Hanford Company, Richland, Washington. Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D195064321>
6. WHC-EP-0342 Addendum 14, 1990, *PUREX Plant Ammonia Scrubber Condensate Stream-Specific Report*, Westinghouse Hanford Company, Richland, Washington. Available at: <http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D196021609>