



U.S. Department of Energy  
~~OFFICE OF RIVER PROTECTION~~  
P.O. Box 450, MSIN H6-60  
Richland, Washington 99352

NOV 19 2012

12-ECD-0060

Mr. John Martell, Manager  
Radioactive Air Emissions Section  
Washington State Department of Health  
309 Bradley Blvd., Suite 201  
Richland, Washington 99352  
(Hanford Mailstop: B1-42)

Dear Mr. Martell:

U.S. DEPARTMENT OF ENERGY (DOE), OFFICE OF RIVER PROTECTION (ORP) SUBMITS CLOSURE REQUEST FOR NOTICE OF CONSTRUCTION IDENTIFICATION NUMBER 865, INSTALLATION AND OPERATION OF BREATHER FILTERS ON MISCELLANEOUS TANKS FOR THE AIR OPERATING PERMIT (AOP) EMISSION UNIT NUMBERS 894, 1129, 1130, & 1232, AND REQUEST FOR SIGNIFICANT MODIFICATION, HANFORD SITE AOP NUMBER 00-05-006 RENEWAL 1

DOE ORP requests that the State of Washington Department of Health (WDOH) review the attached "NOC Application/Permit Revision/AOP Off-Permit Change Notification" form, Project Title, "Installation and Operation of Breather Filters on Miscellaneous Tanks," for AOP Emission Unit Numbers 894, 1129, 1130, & 1232 (Attachment 1) and the Request for Significant Modification, Hanford Site AOP Number 00-05-006 Renewal 1 (Attachment 2) to WDOH for their incorporation into the FF-01 "Radioactive Air Emissions License." Also attached is the Calculation Cover Sheet (Attachment 3) as documentation for the justification for elimination of the annual Non Destructive Assay requirements.

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

Sincerely,

  
Scott L. Samuelson, Manager  
Office of River Protection

ECD:DWB

Attachments: (3)

cc: See page 2

Mr. John Martell  
12-ECD-0060

-2-

NOV 19 2012

cc w/attachs:

L. Bostic, BNI  
B. G. Erlandson, BNI  
J. A. Bates, CHPRC  
J. Cox, CTUIR  
S. Harris, CTUIR  
K. A. Conaway, Ecology  
P. M. Gent, Ecology  
D. Bartus, EPA (Region 10, Seattle)  
D. Zhen, EPA (Region 10, Seattle)  
R. H. Anderson, MSA  
T. G. Beam, MSA  
K. A. Peterson, MSA  
G. Bohnee, NPT  
K. Niles, Oregon Energy  
D. E. Jackson, RL  
R. Jim, YN  
J. W. Schmidt, WDOH  
R. M. Allen, WRPS  
L. L. Penn, WRPS  
B. P. Rumburg, WRPS  
Administrative Record  
BNI Correspondence  
Environmental Portal, LMSI  
WRPS Correspondence

Attachment 1  
12-ECD-0060  
(1 Page)

NOC Application/Permit Revision/AOP Off-Permit Change Notification  
“Installation and Operation of Breather Filters on Miscellaneous Tanks”

# NOC Application/Permit Revision/AOP Off-Permit Change Notification

NOTE: Any increase to abated or unabated PTE requires a full NOC modification

## REASON FOR CHANGE

Submittal Date: \_\_\_\_\_

**NOC Application Revision**

**Condition Change/ Clarification**

: \_\_\_\_\_

WDOH Condition Number: all

AOP Condition Number: all

**ALARACT Revision**

New ALARACT Rev Number: \_\_\_\_\_

## PROJECT IDENTIFICATION

Project Title: Installation and Operation of Breather Filters on Miscellaneous Tanks

Current NOC Application Number: \_\_\_\_\_

AEI ID Number (AOP Emission Unit Number(s)): 894, 1129, 1130, & 1232

Current WDOH Approval Letter Number(s): AIR 12-342

WDOH NOC ID Number: 865

## DESCRIPTION OF CHANGE

Number of Attachments 2

*WDOH will provide a new approval letter containing any new or modified conditions that result from the following proposed change.*

Proposed Change (provide original and proposed wording):

Request closure of this NOC\_ID for these emission units. This NOC was for activities leading up to and including installation of a passive breather filter on tanks 241-UX-302A, 241-AZ-154, 241-U-301B and 241-S-302. This activity is now complete.

In addition, please revise the name identified with Emission Unit 1232. Currently it is identified as 241-S-302. The correct nomenclature is 240-S-302.

Request removal of the annual NDA requirement for Emission Unit 1232. This NDA requirement was initiated due to an estimated unabated emission value of 0.188 mrem/yr based upon limited information when the NOC application was developed. Now with the availability of the filter NDA results a more accurate unabated emission estimate for this facility of has been determined - see attachment. This new estimate places the unabated total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) from the 240-S-302 catch tank at 7.53E-09 mrem/yr.

Lastly, re-designate Emission Unit 1232 from major to minor.

## SIGNATURES

Reviewed by Contractor	Reviewed by RL/ORP	Approved by WDOH
Date:	Date:	Date:

Attachment 2  
12-ECD-0060  
(2 Pages)

Request for Significant Modification

Hanford Site AOP Number 00-05-006 Renewal 1

## REQUEST FOR SIGNIFICANT MODIFICATION

### Hanford Site AOP Number 00-05-006 Renewal 1

(Attach the completed Notification of Permit Modification Request to the EPA/affected states/tribes Form)

Significant modifications are allowed under WAC 173-401-725(4) for those modifications that do not meet the requirements for a minor modification or an administrative amendment.

#### Identify the emission point and describe the proposed change:

AOP Emission Unit Numbers 894, 1129, 1130, & 1232, WDOH NOC ID Number 865, Approved under WDOH Approval Letter Number AIR 12-342, "Project Title Installation and Operation of Breather Filters on Miscellaneous Tanks."

Request closure of this NOC\_ID for these emission units. This NOC was for activities leading up to and including installation of a passive breather filter on tanks 241-UX-302A, 241-AZ-154, 241-U-301B and 241-S-302. This activity is now complete.

In addition, please revise the name identified with Emission Unit 1232. Currently it is identified as 241-S-302. The correct nomenclature is 240-S-302.

Request removal of the annual NDA requirement for Emission Unit 1232. This NDA requirement was initiated due to an estimated unabated emission value of 0.188 mrem/yr based upon limited information when the NOC application was developed. Now with the availability of the filter NDA results a more accurate unabated emission estimate for this facility of has been determined - see attachment. This new estimate places the unabated total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) from the 240-S-302 catch tank at 7.53E-09 mrem/yr.

Lastly, re-designate Emission Unit 1232 from major to minor.

#### Describe the emissions resulting from the proposed change:

Potential emissions have been shown via use of the NDA results to be 7.53E-09 mrem/yr rather than the currently permitted value of 0.188 mrem/yr.

#### Describe the new applicable requirements that will apply as a result of the proposed change:

Removal of the annual NDA requirement for Emission Unit 1232 will result in the typical condition which reads as follows:

Smear survey on the inside surface of the ducting and downstream of the HEPA filter or on the outside of the screen covering the outlet of the vent. Smear levels below 10,000 dpm/100cm<sup>2</sup> beta/gamma and 200 dpm/100cm<sup>2</sup> alpha will verify low emissions.

Radial breather filters shall be replaced every 365 days.

#### Provide suggested AOP revisions to reflect the proposed change:

- *Monitoring/PCM that will be used to support compliance determination/certification.*
- *Description of air pollution control equipment (abatement technology).*
- *Other controls such as limits on inventory; process limits such as throughput, hours of operation, or acceptance criteria; or other assumptions used in potential to emit calculations.*
- *Other process descriptions that constitute a term or condition, such as reporting or recordkeeping requirements.*

No change to what is currently written in the permit.

**CERTIFICATION**

*Provide certification pursuant to WAC 173-401-520*

I certify that based on information and belief formed after reasonable inquiry of the person or persons who perform activities, or those persons directly responsible for gathering the information, the statements and information provided in this modification request are true, accurate, and complete.

Responsible Official: *Scott C. Samuelson*

Title: *manager*

Signature:



Date:

*11/19/12*

Attachment 3  
12-ECD-0060  
(11 Pages)

Calculation Cover Sheet

Calc. No. RPP-CALC-53464

# CALCULATION COVER SHEET

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

1. Calc. No. RPP-CALC-53464

Rev. 0

2. Page 1

2a. Total Pages: 11

3. Document Media  Hard Copy  PDF

4. Job/Project Name/Number  
240-S-302

5. Calculation Title/Subject  
Unabated TEDE to the MEI Calculation for the Catch Tank Breather Filter Based upon  
NDA Results

6. Date  
9/25/12

7. Originator's Name, Organization, & Phone No.  
Gary Crummel, Base Ops Environmental Compliance, 373-3442

8. USQ Number  N/A  
 No. - - - R-  
*GR Decker* *GR* 10/10/12  
 USQ Evaluator Sign/Date

9. PrHA Number  N/A  
No.

10. Building/Facility No.  
240-S-302

11. System  
Breather Filter

12. Structure  
Catch Tank

13. Equipment ID No. (EIN)  
240-S-302

14. Safety Designation  
 SC  SS  GS  NA

15. Design Verification Required?  
 Yes  No  
  
If Yes, as a minimum attach  
the one page checklist from  
TFC-ENG-DESIGN-P-17.

16. Related Documents/ECNs/EDTs  
None

17. TBDs or HOLDS in Calculation?  
 Yes  No

19. Native File(s) Submitted?  
 Yes  No  
References are provided  
within the document.

18. Approval Designator  
E

20. Software Used  
 Yes  No

21. Program Name and Version  
na

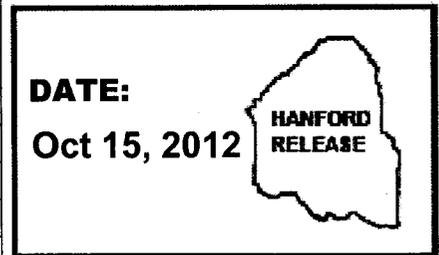
22. Software Validation/Verification Document Number  
na

23. Technical Baseline Document  
 Yes  No

24. Distribution (Use Distribution Sheet Form # A-6000-135 as required)

Release Stamp

Name	MSIN	Name	MSIN
Dale L. Dyekman	S5-07		
John D. Guberski	R151		
Gary M Crummel	R1-51		
Jeff A. Voogd	R1-51		
Lucinda L. Penn	H6-14		
Dustin B Rorden	S5-08		
Jeremy S Dubois	S5-08		



25. Clearance Review

Cleared For Public Release? Yes  No  Restricted Use? Yes  No  Restriction Type:

26. Trademark Disclaimer

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America.

27. Clearance Review:

**APPROVED**

By Marguerite Washington at 2:02 pm, Oct 15, 2012

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

(Printed Name and Signature)

# CALCULATION COVER SHEET

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

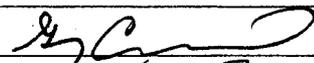
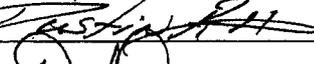
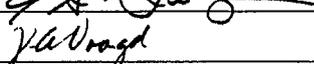
1. Calc. No. ~~53464~~  
 Rev. 0 *RPP-CALC-53464*  
 2. Page 2  
 2a. Total Pages: 211  
 3. Document Media  Hard Copy  PDF

28. Impacted Documents - Non Engineering		29. Impacted Documents - Engineering	
(a) Type of Document	(b) Document Number	(a) Type of Document	(b) Document Number
None			

30. **Description of Issue/Revision** (Use continuation pages as required)  
 This calculation was developed as the basis for requesting an Air Operating Permit (AOP) approval condition modification which if granted would eliminate the requirement to perform annual NDA measurements on the 240-S-302 catch tank breather filter.

31. **Justification for Issue/Revision** (Use continuation pages as required)  
 NDA results performed because of the AOP approval condition indicate that required annual NDA measurements on the breather filter are not warranted.

32. Key			
(a) Reason for Transmittal		(b) Disposition	
1. Approval	2. Review	1. Approved	3. Reviewed no comment
		2. Approved w/comment	4. Reviewed w/comment
			5. Disapproved

33. Approvals					
(a) Reason	(b) Disposition	(c) Title	(d) Printed Name and Signature	(e) Date	(f) MSIN
1	/	Originator	Gary Crummel 	10/8/12	R1-51
1	/	Responsible Engr.	Dustin Rorden 	10/8/12	S5-08
1	/	Cover Sheet Checker	Dale Dyekman 	10/8/12	S5-07
1	/	Design Authority	Jeremy Dubois 	10/8/12	S5-08
1	/	Responsible Mgr.	Jeff Voogd 	10/9/12	R1-51

### Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results

Engineer/Analyst: Gary CrummelDate: 10/8/12Checker: Dale DyekmanDate: 10/9/12

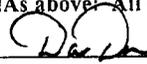
#### Calculation Checklist.

Calculation Title/Subject: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results

Scope of Review: (e.g. document section or portion of calculation) AllEngineer/Analyst: (printed name and signature) Gary CrummelDate: 10/08/12Organizational Manager: (printed name and signature) Jeff VoogdDate: 10/9/12

Yes	No	NA*	
x			a. The objective/purpose of the calculation is clearly stated and the problem is completely defined by the purpose statement.
x			b. Analytical and technical approaches and results are reasonable and appropriate.
x			c. Input data are adequately described, referenced to their source, and checked for consistency with original source information.
x			d. Necessary assumptions are reasonable, explicitly stated, and supported. Assumptions requiring verification prior to use are clearly stated and identified/tracked using TBD/HOLD numbers.
x			e. For both qualitative and quantitative data, uncertainties are recognized and discussed and the data is presented in a manner to minimize design interpretations.
x			f. Mathematical derivations were checked, including dimensional consistency of results.
x			g. Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
		x	h. Hand and MathCAD® calculations were verified, including review that correct input data are used, formulae correctly interpret intended expressions, correct units are used, and results are reasonable and appropriate.
		x	i. Software applications used are identified by the program name and version/release number, both on the calculation cover sheet and in the body of the document.
		x	j. Software input data is identified and/or attached/included, the input data is correct, and consistent with the calculation document.
		x	k. Software output is consistent with the input and with the results reported in the calculation document.
		x	l. Software verification and validation are addressed adequately in accordance with TFC-BSM-IRM_HS-C-01. Software verification documentation is noted on the calculation cover sheet and in the body of the document as included in the calculation document or a reference is provided to separate verification documentation.
		x	m. Spreadsheets used in the calculation are identified, verified, and documented in accordance with TFC-ENG-DESIGN-C-32. Reference to the corresponding spreadsheet verification form is provided on the calculation cover sheet and in the body of the calculation.
x			n. Data or results presented in tables and graphs have been checked against original source.
x			o. Unit conversions are correct and consistent.
x			p. The number of significant digits is appropriate and consistent.
x			q. Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
x			r. Conclusions are consistent with analytical results and applicable limits.
x			s. Results and conclusions address all points in the purpose.
x			t. Referenced documents are retrievable or otherwise available and the version or revision of each reference is cited.
x			u. The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions," of TFC-ENG-DESIGN-C-10.
x			v. Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents, as appropriate.
x			w. All checker comments have been dispositioned and the design media matches the calculations.

\*Explanation of NAs above: All calculations were done by hand.

Dale Dyekman 

Checker (printed name and signature) Date

\* If less than the entire calculation was checked, the scope of the check should be discussed. If any blocks are checked "No" or "NA", an explanation must be provided here or attached

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12

Checker: Dale Dyekman Date: 10/9/12

## I. Objective/Purpose

This calculation was performed to estimate the unabated total effective dose equivalent (TEDE) to the maximum exposed individual (MEI) resulting from the 240-S-302 catch tank using 2010 and 2011 radionuclide nondestructive assay (NDA) results. The 240-S-302 catch tank is permitted as an emission unit in the Hanford Site Air Operating Permit (AOP) under Emission Unit ID 1232. Approval order AIR-12-342, NOC\_ID 865 currently requires that an annual nondestructive assay (NDA) of the HEPA filter be conducted for reporting purposes - see reference AIR-12-343. This approval condition was required due to the conservatively high value of the estimated unabated TEDE (potential emissions) detailed in the Notice of Construction (NOC) application – see reference 08-ESQ-175. It was high due to use of a conservative 1.0E-03 emission release fraction specified for use within the regulations if no other approved method is available – see WAC 246-247-030(21)(a)(ii).

Determination of a more representative emission release fraction is also allowed by regulation from measurement quantities of radionuclides captured in emission control devices. A HEPA filter is an emission control device and an NDA result provides a measurement of the radionuclides captured within it. Therefore, the 2010 and 2011 HEPA filter NDA results were used to determine a new release fraction. This new release fraction was then used to provide a better potential emission estimate for the 240-S-302 catch tank. Lastly, this, new lower and more representative potential emission estimate will be used to request elimination of the AOP annual NDA requirement for the 240-S-302 catch tank HEPA filter.

## II. Input Data

The NDA results used in this calculation are documented in the 2 letters to John Prilucik referenced below. The results are listed in Table 1.

Letter Date for NDA	Detected Radionuclide Results ( $\mu\text{Ci}$ )	
	Cs-137	Pb-210
4/20/2010	6.05E-04	1.39E-02
4/26/2011	3.549E-04	1.739E-02
Average	4.80E-04	1.56E-02

The average of the two NDA results for Cs-137 and Pb-210 are the summation of the two values divided by 2. These averages are included in Table 1, above. The conversion of these micro-curie ( $\mu\text{Ci}$ ) values to Curies (Ci) is performed by recognizing there are 1 million micro-curies in a curie. Therefore:

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12

Checker: Dale Dyekman Date: 10/9/12

Cs-137:  $4.80\text{E-}04 \mu\text{Ci times } 1 \text{ Ci divided by } 1\text{E+}6 \mu\text{Ci} = 4.80\text{E-}10 \text{ Ci}$ , and

Pb-210:  $1.56\text{E-}02 \mu\text{Ci times } 1 \text{ Ci divided by } 1\text{E+}6 \mu\text{Ci} = 1.56\text{E-}08 \text{ Ci}$

Table 5, "Tank 241-S-302 Inventory," within reference 08-ESQ-175 provided a list of radionuclides and their corresponding annual possession quantities (APQ). Note that Ni-94 and Cm-144 were deemed incorrectly listed. From comparison of the CAP-88 factors listed in Table 9, "Tank 241-S-302 Release Rates," of reference 08-ESQ-175 with the CAP-88 factors listed in Table 4-10, "200 West Area: Offsite and Onsite MPRs CAP88-PC Dose-per-Unit-Release Factors (mrem/Ci) by Effective Release Height," of DOE/RL-2006-29, Revision 0, Ni-94 and Cm-144 were determined to actually be Nb-94 and Ce-144 respectively. In addition, also note that both Table 5 and Table 9 of reference 08-ESQ-175 have incorrectly identified the tank as 241-S-302 instead of 240-S-302. With these corrections, Table 2 provides the list of radionuclides used to estimate the TEDE to the MEI in the NOC application (reference 08-ESQ-175).

Radionuclides	APQ (Ci)
Co-60	3.90E-01
Sr-90	1.58E+03
Nb-94	4.64E-01
Ru/Rh-106	8.27E+00
Sb-125	1.21E+00
Cs-134	4.16E-01
Cs-137	4.28E+01
Ce-144	1.62E+00
Eu-152	1.77E+00
Eu-154	1.28E+00
Eu-155	8.39E-01
Ra-226	6.39E+00
Pu-239/240	3.05E+00
Am-241	1.64E+00
Cm-243/244	1.96E-01

The most up-to-date CAP-88 values from Table 4-8, "200 West Area: Offsite and Onsite MEIs CAP88-PC Dose-per-Unit-Release Factors (mrem/Ci) by Effective Release Height," of DOE/RL-2006-29, Revision 1 were also used in this calculation. These values are listed in Table 3.

**Table 3: CAP-88 Values**

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather  
Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12

Checker: Dale Dyekman Date: 10/9/12

Radionuclides	Offsite MEI	Onsite MEI <sup>(a)</sup>
	mrem/Ci	
Co-60	3.05E-02	2.80E-02
Sr-90	1.58E-01	1.47E-02
Nb-94	1.14E-02	1.85E-02
Ru/Rh-106	4.80E-03	3.23E-03
Sb-125	3.45E-03	5.01E-03
Cs-134	1.15E-01	2.40E-02
Cs-137	8.70E-02	1.29E-02
Ce-144	3.55E-03	4.30E-03
Eu-152	1.03E-02	1.70E-02
Eu-154	1.19E-02	1.93E-02
Eu-155	8.98E-04	1.38E-03
Pb-210	2.87E-01	1.31E-01
Ra-226	4.22E-01	4.17E-01
Pu-239/240	3.34E+00	5.68E+00
Am-241	2.78E+00	4.73E+00
Cm-243/244	2.10E+00	3.57E+00

### III. Assumptions

HEPA filters are rated at collecting 99.97% of particulate emissions. HEPA filter NDA results, therefore, provide a good indication of what potential emissions have been. To convert NDA results to potential emissions, the result needs to be divided 99.97%. This calculation increases the NDA result by an insignificant factor of 1.0003. Since 1.0003 will not change the results by any significance, it is assumed that the HEPA filter NDA results adequately represent emissions from the 240-S-302 tank.

To estimate potential emissions, a release fraction was determined from an average of the NDA results. This result was assumed to conservatively represent the fraction of the quantities of each radionuclide contained within the APQ (see Table 3) that were released into the air and that, in this case, were captured on the HEPA filter.

Since Cs-137 was the only radionuclide seen in both the APQ and in the NDA results, a release fraction was derived for Cs-137. This fraction was assumed to be representative for all the other radionuclides as well.

Pb-210 was also seen in the NDA result. Even though Pb-210 was not listed in the APQ, Pb-210 was still assumed to be a portion of the potential emissions. In this case, no release fraction was used because the Pb-210 seen in the NDA results were assumed to all be released.

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather  
Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12

Checker: Dale Dyekman Date: 10/9/12

#### IV. Method of Analysis

A release fraction of 1.0E-03 was used in the NOC Application. This fraction was used at the time because it is specified for use within the regulations if no other approved method is available – see WAC 246-247-030(21)(a)(ii). Determination of a release fraction from measurement quantities of radionuclides captured in the control device is also allowed. NDA results provide this measurement. Therefore, potential emissions were estimated by deriving a release fraction for the APQ values from the NDA results.

Since a Cs-137 value is listed both in the APQ and in the NDA, a release fraction was determined for Cs-137 by assuming that the NDA value represented the quantity of Cs-137 which was released. In order to determine the release fraction for all the other radionuclides, it was assumed that the Cs-137 release fraction was representative for all the other radionuclides listed in the APQ as well. The Cs-137 release factor was determined by dividing the average quantity found on the filters in the NDA results (see Table 1) by the quantity found in the APQ (see Table 2). This calculation is as follows:

$$\text{Cs-137 release fraction: } 4.80\text{E-10 Ci divided by } 4.28\text{E+01 Ci} = 1.12\text{E-11}$$

This release fraction is then multiplied by the quantities of all the other radionuclides listed in the APQ (see Table 2). Applying this release fraction to all the other radionuclides yielded the following results:

$$\text{Co-60: } 3.90\text{E-01 Ci times } 1.12\text{E-11} = 4.37\text{E-12 Ci}$$

$$\text{Sr-90: } 1.58\text{E+03 Ci times } 1.12\text{E-11} = 1.77\text{E-08 Ci}$$

$$\text{Nb-94: } 4.64\text{E-01 Ci times } 1.12\text{E-11} = 5.20\text{E-12 Ci}$$

$$\text{Ru/Rh-106: } 8.27\text{E+00 Ci times } 1.12\text{E-11} = 9.27\text{E-11 Ci}$$

$$\text{Sb-125: } 1.21\text{E+00 Ci times } 1.12\text{E-11} = 1.36\text{E-11 Ci}$$

$$\text{Cs-134: } 4.16\text{E-01 Ci times } 1.12\text{E-11} = 4.66\text{E-12 Ci}$$

$$\text{Cs-137: } 4.28\text{E+01 Ci times } 1.12\text{E-11} = 4.80\text{E-10 Ci}$$

$$\text{Ce-144: } 1.62\text{E+00 Ci times } 1.12\text{E-11} = 1.81\text{E-11 Ci}$$

$$\text{Eu-152: } 1.77\text{E+00 Ci times } 1.12\text{E-11} = 1.98\text{E-11 Ci}$$

$$\text{Eu-154: } 1.28\text{E+00 Ci times } 1.12\text{E-11} = 1.43\text{E-11 Ci}$$

$$\text{Eu-155: } 8.39\text{E-01 Ci times } 1.12\text{E-11} = 9.40\text{E-12 Ci}$$

$$\text{Ra-226: } 6.39\text{E+00 Ci times } 1.12\text{E-11} = 7.16\text{E-11 Ci}$$

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12

Checker: Dale Dyekman Date: 10/9/12

Pu-239/240:  $3.05E+00$  Ci times  $1.12E-11$  =  $3.42E-11$  Ci

Am-241:  $1.64E+00$  Ci times  $1.12E-11$  =  $1.84E-11$  Ci

Cm-243/244:  $1.96E-01$  Ci times  $1.12E-11$  =  $2.20E-12$  Ci

Table 4 compiles the calculated released values based upon the NDA results and the reasoning just explained. Pb-210 is included because it was found in the HEPA filter NDA results.

Radionuclides	Estimated Releases (Ci)
Co-60	4.37E-12
Sr-90	1.77E-08
Nb-94	5.20E-12
Ru/Rh-106	9.27E-11
Sb-125	1.36E-11
Cs-134	4.66E-12
Cs-137	4.81E-10
Ce-144	1.82E-11
Eu-152	1.98E-11
Eu-154	1.43E-11
Eu-155	9.40E-12
Pb-210	1.56E-08
Ra-226	7.16E-11
Pu-239/240	3.42E-11
Am-241	1.84E-11
Cm-243/244	2.20E-12

In order to determine potential emissions to the MEI, the table 4 release estimates were multiplied by the respective CAP88 values listed in Table 3 and summed. The calculations are as follows:

**For the Off Site MEI:**

Co-60:  $4.37E-12$  Ci times  $3.05E-02$  mrem/Ci =  $1.33E-13$  mrem  
 Sr-90:  $1.77E-08$  Ci times  $1.58E-01$  mrem/Ci =  $2.80E-09$  mrem  
 Nb-94:  $5.20E-12$  Ci times  $1.14E-02$  mrem/Ci =  $5.93E-14$  mrem  
 Ru/Rh-106:  $9.27E-11$  Ci times  $4.80E-03$  mrem/Ci =  $4.45E-13$  mrem  
 Sb-125:  $1.36E-11$  Ci times  $3.45E-03$  mrem/Ci =  $4.69E-14$  mrem  
 Cs-134:  $4.66E-12$  Ci times  $1.15E-01$  mrem/Ci =  $5.36E-13$  mrem  
 Cs-137:  $4.80E-10$  Ci times  $8.70E-02$  mrem/Ci =  $4.18E-11$  mrem

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather  
Filter Based Upon NDA Results**

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Ce-144:  $1.81E-11$  Ci times  $3.55E-03$  mrem/Ci =  $6.46E-14$  mrem  
 Eu-152:  $1.98E-11$  Ci times  $1.03E-02$  mrem/Ci =  $2.04E-13$  mrem  
 Eu-154:  $1.43E-11$  Ci times  $1.19E-02$  mrem/Ci =  $1.71E-13$  mrem  
 Eu-155:  $9.40E-12$  Ci times  $8.98E-04$  mrem/Ci =  $8.45E-15$  mrem  
 Pb-210:  $1.56E-08$  Ci times  $2.87E-01$  mrem/Ci =  $4.48E-09$  mrem  
 Ra-226:  $7.16E-11$  Ci times  $4.22E-01$  mrem/Ci =  $3.03E-11$  mrem  
 Pu-239/240:  $3.42E-11$  Ci times  $3.34E+00$  mrem/Ci =  $1.14E-10$  mrem  
 Am-241:  $1.84E-11$  Ci times  $2.78E+00$  mrem/Ci =  $5.12E-11$  mrem  
 Cm-243/244:  $2.20E-12$  Ci times  $2.10E+00$  mrem/Ci =  $4.62E-12$  mrem

Therefore the offsite potential emissions to the MEI is as follows:  $1.33E-13 + 2.80E-09 + 5.93E-14 + 4.45E-13 + 4.69E-14 + 5.36E-13 + 4.18E-11 + 6.46E-14 + 2.04E-13 + 1.71E-13 + 8.45E-15 + 4.48E-09 + 3.03E-11 + 1.14E-10 + 5.12E-11 + 4.62E-12 = 7.53E-09$  mrem

**For the On Site MEI:**

Co-60:  $4.37E-12$  Ci times  $2.80E-02$  mrem/Ci =  $1.22E-13$  mrem  
 Sr-90:  $1.77E-08$  Ci times  $1.47E-02$  mrem/Ci =  $2.60E-10$  mrem  
 Nb-94:  $5.20E-12$  Ci times  $1.85E-02$  mrem/Ci =  $9.62E-14$  mrem  
 Ru/Rh-106:  $9.27E-11$  Ci times  $3.23E-03$  mrem/Ci =  $3.14E-13$  mrem  
 Sb-125:  $1.36E-11$  Ci times  $5.01E-03$  mrem/Ci =  $6.81E-14$  mrem  
 Cs-134:  $4.66E-12$  Ci times  $2.40E-02$  mrem/Ci =  $1.12E-13$  mrem  
 Cs-137:  $4.80E-10$  Ci times  $1.29E-02$  mrem/Ci =  $6.19E-12$  mrem  
 Ce-144:  $1.81E-11$  Ci times  $4.30E-03$  mrem/Ci =  $7.83E-14$  mrem  
 Eu-152:  $1.98E-11$  Ci times  $1.70E-02$  mrem/Ci =  $3.37E-13$  mrem  
 Eu-154:  $1.43E-11$  Ci times  $1.93E-02$  mrem/Ci =  $2.78E-13$  mrem  
 Eu-155:  $9.40E-12$  Ci times  $1.38E-03$  mrem/Ci =  $1.30E-14$  mrem  
 Pb-210:  $1.56E-08$  Ci times  $1.31E-01$  mrem/Ci =  $2.05E-09$  mrem  
 Ra-226:  $7.16E-11$  Ci times  $4.17E-01$  mrem/Ci =  $2.99E-11$  mrem  
 Pu-239/240:  $3.42E-11$  Ci times  $5.68E+00$  mrem/Ci =  $1.94E-10$  mrem  
 Am-241:  $1.84E-11$  Ci times  $4.73E+00$  mrem/Ci =  $8.70E-11$  mrem  
 Cm-243/244:  $2.20E-12$  Ci times  $3.57E+00$  mrem/Ci =  $7.85E-12$  mrem

Therefore the onsite potential emissions to the MEI is as follows:  $1.22E-13 + 2.60E-10 + 9.62E-14 + 3.14E-13 + 6.81E-14 + 1.12E-13 + 6.19E-12 + 7.83E-14 + 3.37E-13 + 2.78E-13 + 1.30E-14 + 2.05E-09 + 2.99E-11 + 1.94E-10 + 8.70E-11 + 7.85E-12 = 2.64E-09$  mrem

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather Filter Based Upon NDA Results**

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Table 5 is provided to tabulate the potential emissions to the MEI values just determined.

Table 5: Potential Emissions to the MEI Summary							
Radionuclide	APQ Value	Release Factor	Estimated Release Based Upon NDA Results	CAP88 Values		TEDE to the MEI	
				Offsite	Onsite	Offsite	Onsite
	Ci		Ci	mrem/Ci		Mrem	
Co-60	3.90E-01	1.12E-11	4.37E-12	3.05E-02	2.80E-02	1.33E-13	1.22E-13
Sr-90	1.58E+03	1.12E-11	1.77E-08	1.58E-01	1.47E-02	2.80E-09	2.60E-10
Nb-94	4.64E-01	1.12E-11	5.20E-12	1.14E-02	1.85E-02	5.93E-14	9.62E-14
Ru/Rh-106	8.27E+00	1.12E-11	9.27E-11	4.80E-03	3.23E-03	4.45E-13	3.14E-13
Sb-125	1.21E+00	1.12E-11	1.36E-11	3.45E-03	5.01E-03	4.69E-14	6.81E-14
Cs-134	4.16E-01	1.12E-11	4.66E-12	1.15E-01	2.40E-02	5.36E-13	1.12E-13
Cs-137	4.28E+01	1.12E-11	4.80E-10	8.70E-02	1.29E-02	4.18E-11	6.19E-12
Ce-144	1.62E+00	1.12E-11	1.81E-11	3.55E-03	4.30E-03	6.46E-14	7.83E-14
Eu-152	1.77E+00	1.12E-11	1.98E-11	1.03E-02	1.70E-02	2.04E-13	3.37E-13
Eu-154	1.28E+00	1.12E-11	1.44E-11	1.19E-02	1.93E-02	1.71E-13	2.78E-13
Eu-155	8.39E-01	1.12E-11	9.40E-12	8.98E-04	1.38E-03	8.45E-15	1.30E-14
Pb-210			1.56E-08	2.87E-01	1.31E-01	4.48E-09	2.05E-09
Ra-226	6.39E+00	1.12E-11	7.16E-11	4.22E-01	4.17E-01	3.03E-11	2.99E-11
Pu-239/240	3.05E+00	1.12E-11	3.42E-11	3.34E+00	5.68E+00	1.14E-10	1.94E-10
Am-241	1.64E+00	1.12E-11	1.84E-11	2.78E+00	4.73E+00	5.12E-11	8.70E-11
Cm-243/244	1.96E-01	1.12E-11	2.20E-12	2.10E+00	3.57E+00	4.62E-12	7.85E-12
Sum						7.53E-09	2.64E-09

## V. Results

The unabated TEDE to the MEI is 7.53E-09 based upon an average of the 2 NDA results for the 240-S-302 breather filters.

## VI. Conclusions

The result of the 7.53E-09 is sufficient justification for a request to remove the annual NDA requirement from the 240-S-302 catch tank permitted under Emission Unit ID 1232, approval order AIR-12-342, NOC\_ID 865.

**Title: Unabated TEDE to the MEI Calculation for the 240-S-302 Catch Tank Breather  
Filter Based Upon NDA Results**

Engineer/Analyst: Gary Crummel Date: 10/8/12  
Checker: Dale Dyekman Date: 10/9/12

## VII. References

08-ESQ-175, to John Martell, Manager WDOH, from Shirley J. Olinger, Manager ORP, Subject: Request for Approval of Modification to Radioactive Air Emissions Notice of Construction (NOC) and Approval for Installation of Breather Filters on Miscellaneous Tanks and Amendment to Hanford Site Air Operating Permit (AOP) for Emission Unit 200W C-296S302, Dated July 30, 2008.

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Letter, to John Prilucik, WRPS, from Andrey Mozhayev, PNNL, no subject, dated April 26, 2011.

Letter, to John Prilucik, WRPS, from Andrey Mozhayev, PNNL, no subject, dated April 20, 2010.

WAC-246-247, Radiation Protection – Air Emissions

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