DEPARTMENT OF
ECOLOGY
State of Washington

Rotary Core Sampling Systems for Hanford's Tanks

May 31 through July 3, 2015

Summary of a public comment period and responses to comments

October 2019

Publication no. 19-05-014

Publication and Contact Information

This publication is available on the Department of Ecology's (Ecology) website at https://fortress.wa.gov/ecy/publications/SummaryPages/1905014.html

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- Northwest Regional Office, Bellevue 425-649-7000
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- Eastern Regional Office, Spokane 509-329-3400

Ecology publishes this document to meet the requirements of Washington Administrative Code 173-303-840 (9).

To request ADA accommodation including materials in a format for the visually impaired, call Ecology at 509-372-7950 or visit https://ecology.wa.gov/accessibility. People with impaired hearing may call Washington Relay Service at 711. People with speech disability may call TTY at 877-833-6341.

Response to Comments

Rotary Core Sampling Systems for Hanford's Tanks
May 31 through July 3, 2015

Nuclear Waste Program
Washington State Department of Ecology
Richland, Washington

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Introduction

The Washington State Department of Ecology's Nuclear Waste Program (Ecology) regulates air pollution sources at the Hanford Site through permits. These permits ensure Hanford's air emissions stay within regulatory limits to protect people and the environment. When a new permit or a modification to an existing permit is proposed, Ecology holds a public comment period to allow the public to review the change and provide formal feedback.

The comment period covered by this response to comments was for a draft Notice of Construction Approval Order.

The Response to Comments is the last step before issuing the final permit, and its purpose is to:

1. *Describe and document public involvement actions.*
2. *List and respond to all significant comments received during the public comment period and any related public hearings.*

This Response to Comments is prepared for:

Comment period:	Rotary Core Sampling Systems for Hanford's Tanks
	May 31 through July 3, 2015
Permit:	*Approval Order DE14NWP-001*
Permittee(s):	*United States Department of Energy, Office of River*
Effective date:	*Protection* 10/1/2019

To see more information related to the Hanford Site and nuclear waste in Washington, please visit our website: https://www.ecology.wa.gov/Hanford.

Reasons for issuing the permit

The United States Department of Energy (USDOE) proposed to modify their existing facility located on the Hanford site in Richland, Washington.

At the Hanford Site, USDOE is engaged in a cleanup effort to address the waste resulting from decades of plutonium production. Much of the waste to be cleaned up is stored in underground tanks near the center of Hanford, several miles from any residence or agricultural land. The tanks store high-level radioactive and chemical waste remaining from Hanford's plutonium manufacturing.

USDOE has requested a new permit to install up to two rotary core sampling systems for Hanford's underground tanks. The rotary core sampling systems are needed to collect samples of solid materials in the tanks so the waste can be managed more safely.

Public involvement actions

Ecology encouraged public comment on the draft Approval Order DE14NWP-001 during a 30-day public comment period held May 31, 2015 through July 3, 2015.

The following actions were taken to notify the public:

- Placed a public announcement legal classified advertisement was placed in the Tri-City Herald on May 31, 2015.
- Emailed an advance notice announcing the start of the comment period to the Hanford-Info email list, which has 1,245 recipients.
- Emailed a notice announcing the start of the comment period to the Hanford-Info email list, which has 1,245 recipients.
- Posted the comment period as an event on the Washington Department of Ecology – Hanford's Facebook page.

The following documents were made available for public review:

- Public notice
- Transmittal letter
- Application
- State Environmental Policy Act determination
- Second Tier Petition Response
- Draft Approval Order DE14NWP-001

The following public notices for this comment period are in Appendix A of this document:

- Public notice (focus sheet)
- Classified advertisement in the *Tri-City Herald*
- Advanced notice sent to the Hanford-Info email list
- Notice sent to the Hanford-Info email list
- Event posted on the Washington Department of Ecology – Hanford's Facebook page

List of Commenters

Commenter Identification:

The table below lists the names of organizations or individuals who submitted a comment on the draft Approval Order DE14NWP-001 and where you can find Ecology's response to the comment(s).

Commenter	Organization	Comment Number	Page Number
Green, Bill	Citizen	1-7	4

Response to Comments

Ecology accepted comments on the draft Approval Order DE14NWP-001 from May 31, 2015 to July 3, 2015. This section provides a summary of comments we received during the public comment period and our responses. The issuance of this permit was delayed as a result of legal actions taken between USDOE and the State of Washington in regards to vapor emissions from the mixed waste tanks. With a mediated agreement between the two parties, issuance of this Approval Order can continue.

Comments are grouped by individual, and each comment is addressed separately. Please refer to the References section of this document for Exhibit 1. Ecology's responses directly follow each comment in italic font. Verbatim copies of all written comments are attached in Appendix B.

Comment # 1 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

(Incomplete application) Require the permittee to revise and resubmit its application for approval to operate the Core Sampling System in High Purge Gas Mode and, as warranted, revise and resubmit its Second Tier Analysis request.

Ecology Response:

Thank you for your comment, Ecology offers the following response.

While Ecology acknowledges the Hanford Tank Vapor Assessment Report (TVAR), it does not have direct bearing upon analyses conducted pursuant to Washington Administrative Code (WAC) 173-460. As noted on page 12 of 153 of the TVAR:

> *"WRPS [Washington River Protection Solutions] asked the Savannah River National Laboratory (SRNL) to assemble and lead the Hanford Tank Vapors Assessment Team (TVAT) 2014 to determine the adequacy of the established WRPS program and prevalent site practices to protect workers from adverse health effects of exposure to the chemical vapors on the Hanford tank farms."*

The Clean Air Act (CAA), its amendments, and the subsequently approved State Implementation Plan (SIP) regulating ambient air establish the authority for this Approval Order. Ambient air is defined in 40 CFR Part 50.1 (e) as "…that portion of the atmosphere, external to buildings, to which the general public has access." In addition, WAC 173-460-070 requires compliance with the state toxic air pollutant (TAP) requirements be demonstrated "in any area to which the applicant does not restrict or control access." Therefore, the State TAP requirements do not apply within the boundaries of the Hanford Site ambient air boundary, which is the area specifically addressed by the TVAR. Separate rules, regulations, and policies exist to protect workers in these areas.

Additionally, as noted in this comment, the TVAR cited maximums are for bolus emissions. As defined on page 136 of 153 of the *TVAR "Bolus Exposure (BE) is an acute exposure to a*

*relatively high concentration of airborne contaminants. Where time-weighted average exposures may be measured in tens of minutes to hours, bolus exposures are measured in **seconds to tens of seconds**." [emphasis added] Page 133 of 153 of the TVAR further reinforces the transitory and short-range nature of these concentrations, quoting a 2004 modeling study which stated "Peak concentrations over **a few seconds time** period can involve exposure to relatively undiluted air from the tank. Such exposures are limited to being **quite localized** because of the very small volumes of air." [emphasis added]*

The Acceptable Source Impact Level (ASIL) values in WAC 173-46-150 have 1-hour, 24-hour, or annual averaging periods and only apply to the areas to which the public has unrestricted access. Ecology determined that the conservative assumptions used to model the increase in ambient air concentrations outside the Hanford Site (e.g., in ambient air) demonstrated that operating the core sampling system in high purge mode would not exceed the ASIL values, and that the Health Impact Assessment provided in 14-EDC-0031 and supplemental documentation was acceptable. Therefore, the submitted application is complete and no resubmittal or revision of this application is necessary.

Comment # 2 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Revise the Health Impact Assessment[1] (HIA) to reflect values reported in September, 2014, by the U.S. Department of Energy for n-Nitrosodiethylamine (sic) and Mercury [Elemental] from certain single shell tanks (SSTs).

Ecology Response:

Thank you for your comment, Ecology offers the following response.

The apparent exceedance appeared in the initial application authorized by Approval Order DE11NWP-001 Revision 3 for general tank farm operation and ventilation. Ecology and USDOE determined that the apparent exceedance was a typographic error. A column heading listed values as milligrams per cubic meter when the presented values were in micrograms per cubic meter.

This matter was resolved and Ecology issued DE11NWP-001 Revision 3 on January 5, 2016. Public notice was conducted in accordance with RCW 34.05.325(6)(a)(iii) from October 25 through November 25, 2015. Ecology then revised this Approval Order with DE11NWP-001 Revision 4 issued March 3, 2016, and DE11NWP-001 Revision 4 Modification A issued on August 10, 2016.

The updated concentration values, as integrated into Pages 16 through 19 of DE11NWP-001 Revision 3 are included as Exhibit 1. Given that the HIA for DE14NWP-001 is independent of the HIA for DE11NWP-001, and that the erroneous column header is now correct, Ecology did not request an updated HIA supporting DE14NWP-001.

Comment # 3 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Revise Ecology's HIA to account for the highest levels of exposure to Mercury emissions expected from a bolus event. The bolus exposure event was theorized by an independent panel of experts and substantiated by computer modeling. Such modeling indicated "that under certain weather conditions, concentrations approaching 80% of the head space concentration could exist 10 feet downwind from the release point …"[1]. Adding active ventilation and disturbing the tank contents, as the subject core sampling envisions, could increase the magnitude of these transient peaks for Mercury emissions by more than nine hundred percent (900%) of the *occupational exposure limit.*[2] Ecology should use emission data from the best science to determine risk to the public.

(The *Hanford Tank Vapor Assessment Report* examines two conditions, quiescent and disturbed. The subject core sampling with use of exhausters does not appear to qualify as quiescent.)

Ecology Response:

Thank you for your comment, Ecology offers the following response.

As discussed in response to Comment #1 above, occupational exposure limits cited in the TVAR are not directly applicable to the HIA conducted to demonstrate compliance with WAC 173-460. Based upon the conservative assumptions underlying the HIA, the ambient air to which the public might be exposed will not exceed ASIL values. The HIA uses conservative estimates of headspace concentrations and computer modeling of ambient air concentrations.

Concentrations within 10 feet of a release point would only be applicable if that point were publically accessible and therefore ambient air. The referenced modeled values (Droppo 2004) are contained on page 133 of 153 of the TVAR, showing modeled concentration dropped from 81% at 9.8 feet to 0.67% at 328 feet. The data did not address ambient air specifically or provide values at distances greater than 328 feet.

The United States Environmental Protection Agency (US EPA) provides clear guidance on modeling for the CAA in Code of Federal Regulations Title 40 (40 CFR) Part 51 Appendix W, incorporated by reference in 40 CFR §51.166 and §52.21. WAC 173-460-050 and 173-460-090 do not specifically require that applicants base compliance demonstrations upon 40 CFR Part 51 Appendix W, but this framework and approach has been well-established by the US EPA as the preferred approach to modeling. Required inputs for accurate air dispersion modeling are site-specific wind, terrain, and building layouts. These inputs are necessary to properly predict how an exhaust plume will behave and to determine the worst-case off-site concentrations which will occur.

Droppo 2004 specifically and intentionally does not follow 40 CFR Part 51 Appendix W. While it might be possible to extrapolate the modeled drop in concentration from 328 feet out to the property boundary miles away, it would likely create significant inaccuracy. The modeling

provided by USDOE is therefore more appropriate for demonstrating compliance with the CAA,WAC 173-400, and
WAC 173-460. The cited values do not invalidate the HIA and Ecology did not revise the Approval Order based upon this comment.

Comment # 4 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Order Findings 10, 11 and 12 should be discounted because they are based on monitoring and sampling that did not consider short-term bolus events. An independent panel of experts determine these bolus events can result in "…concentrations approaching 80% of the head space concentration [ ] 10 feet downwind from the release point…"[1] These experts further concluded that "[m]onitoring and sampling policy [at Hanford's Tank Farms] appears to be inadequate with respect to detecting short-term episodic exposure. The current policy does not address the potential for wafting plumes or puffs of chemical vapors in relatively high concentrations, which may be occasional and isolated in nature."[2] Giving credence to Findings 10, 11, & 12 only perpetuates use of knowingly-inaccurate emission information for TAPs. Using this inaccurate emission information will result in under-estimating actual emissions from the core sampling project.

Ecology Response:

Thank you for your comment, Ecology offers the following response.

As discussed in response to Comments #3 above, the maximum exposure level and theoretical modeled headspace concentration at 10 feet from an exhaust point are not directly applicable to the HIA conducted to demonstrate compliance with WAC 173-460. Based upon the conservative assumptions underlying the HIA, the ambient air to which the public might be exposed will not exceed ASIL values. Therefore, Ecology did not revise the Approval Order based upon this comment.

Comment # 5 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Require continuous sampling for all TAPs identified in Table 1 of this Order. Sampling should begin immediately before the core sampler enters the tank, continue during sampling operations, and remain in effect until immediately after the core sampling unit is removed from the tank. Current sampling requirements overlooks flaws identified in the *Hanford Tank Vapor Assessment Report*[1] (TVAR).

Ecology Response:

Thank you for your comment, Ecology offers the following response.

1. *As discussed in the response to Comment #1 above, the maximum exposure levels for workers relative to occupational exposure limits is a separate regulatory and legal matter, and is not directly related to the ASIL values for ambient air provided in WAC 173-460-150.*
2. *As discussed in the response to Comment #3 above, the modeled concentration drop-off provided by Droppo 2004 only covers up to 328 feet and does not take into account site-specific wind and terrain information. Extrapolating this drop-off to locations miles away from an emission source is likely to be much less accurate than modeling based upon Appendix W guidance.*
3. *USDOE used worst-case historical sampling data for tank vapor concentrations, which provides the most appropriate data for modeling predicted off-site impacts over an appropriate averaging period. The transient measurements reported in the TVAR do not provide sufficient data on location, concentration with an appropriate averaging period, sampling protocol, or the underlying raw data sufficient to evaluate the results relative to the ASIL values in WAC 173-460-150.*
4. *Continuous monitoring of many TAPs is not technologically possible. One example is dimethyl mercury. The currently available continuous monitoring systems cannot distinguish DMM from elemental mercury and other mercury-containing compounds. Therefore, USDOE would be unable to distinguish between various TAPs and could not use this data to demonstrate compliance with WAC 173-460.*
5. *The testing frequency for Condition 3.2 is contained in Condition 3.0. This frequency is each time the core sampler is operated in high purge gas mode in a tank not previously sampled under this Notice of Construction to verify emission estimates. The intent is to verify emissions with the varying tank constituent concentrations. To clarify this, Condition 3.0 will be revised to state the following:*

   > *"The following sampling and monitoring are required when the core sampler is operating in high purge gas mode in order to verify emission estimates and compliance with Section 1.1 above. Sampling must be conducted the first time the core sampler is operated in a rotary core mode in each tank. Resampling must occur in any tank in which waste transfers have occurred since the initial sampling."*

6. *Condition 3.0 does specify emission assessment timing, which is during operation of the core sampler in high purge mode (i.e. with the portable exhauster actively ventilating the tank and the drill operating). It is not necessary to require testing before the core sampler enters the tank or after it ceases operation because these will not be the worst-case situation for waste disturbance and therefore emissions. Requiring testing before and after the core sampler operates would potentially require that active ventilation operate for longer than is necessary, increasing emissions and exposure for both workers and the public.*

Based upon the above information, no revision to the public notice draft approval order is required with the exception of the change identified in item 5.

Comment # 6 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Require continuous sampling for Ammonia. Sampling should begin immediately before the core sampler enters the tank, continue during sampling operations, and remain in effect until immediately after the core sampling unit is removed from the tank. Current sampling requirements overlook flaws identified in the TVAR[1].

Ecology Response:

Thank you for your comment, Ecology offers the following response.

As discussed in response to comments #1, #3, #4, and #5 above the short-term occupational exposure estimates in the TVAR are not appropriate for evaluating compliance with the CAA, WAC 173-400, or WAC 173-460. Ammonia emissions have been conservatively based upon the worst-case previously sampling and will be confirmed with testing.

Ecology based the averaging period in Condition 1.1.3 directly upon WAC 173-460-150. Ammonia has a 24-hour ASIL and monitoring for continuous compliance would not be consistent with this averaging period. However, requiring a short-term and intermittent operation to continue for a full 24 hours per test would lead to significantly greater, and completely unnecessary, emissions.

As defined on page 136 of 153 of the TVAR, "Bolus Exposure (BE) is an acute exposure to a relatively high concentration of airborne contaminants. Where time-weighted average exposures may be measured in tens of minutes to hours, bolus exposures are measured in seconds to tens of seconds." Assuming a transient spike might cover 10 seconds, it would represent only 0.0116% of the 24-hour averaging period. If the rest of the 24 hours were to remain at the modeled off-site concentration, which is already a conservative assumption because high purge mode will not be used over the entire period, this event would require a concentration spike over a million times greater than the maximum historical measured flux to exceed the ammonia ASIL value (607,072 $\mu g/m^3$ vs. 0.53 $\mu g/m^3$).

<u>Assuming:</u>

A = Ammonia ASIL = 70.8 $\mu g/m^3$

B = Modeled Off-Site Concentration = 0.53 $\mu g/m^3$

C = Concentration of 10 Second Spike Causing ASIL Exceedance = Unknown

D = Seconds per Day = 86,400

$$A = [(D-10) \times B + 10 \times C] \div D$$

$$70.8 = [86{,}390 \times 0.537 + 10 \times C] \div 86{,}400$$

$$C = 607{,}072\ \mu g/m^3$$

Given that short-term spikes would either need to be nearly constant (and would therefore likely be caught in sampling) or would be implausibly concentrated compared to anything previously

documented at the Hanford Site there is no need to require constant ammonia monitoring. Therefore, Ecology did not revise the draft permit for this comment.

Comment # 7 from Bill Green, Citizen, dated June 24, 2015

Ecology is only showing the first paragraph of this comment in this summary. For the complete comment with all citations, footnotes, and explanations, please refer to Appendix B.

Because toxic vapors and gases freely pass through pre-filters and nuclear grade HEPA filters[1], and because it is these toxic vapors and gases that have the potential to impact the public, the core sampler exhaust should be equipped with continuous monitors (including CAMs for radioactive vapors and gases) to help quantify emissions at the point of entry into the atmosphere.

Ecology Response:

Thank you for your comment, Ecology offers the following response.

Ecology agrees that continuous monitoring can be a compliance demonstration method when physically possible, necessary to protect ambient air quality, and practicable. However, not taking a mass-balance approach does not necessarily trigger the need for continuous monitoring.

In fact the US EPA has identified multiple acceptable methods of determining emissions. The October 1990 draft "New Source Review Workshop Manual" (Puzzle Book) listed five such methods on page A.22:

1. *Emissions data from compliance tests or other source tests.*
2. *Equipment vendor emissions data and guarantees.*
3. *Emission limits and test data from US EPA documents, including background information documents for new source performance standards, national emissions standards for hazardous air pollutants, and Section 111d standards for designated pollutants.*
4. *AP-42 emission factors.*
5. *Emission factors from technical literature; or state emission inventory questionnaires for comparable sources.*

The Puzzle Book is still the most complete guidance produced by the US EPA regarding permitting for the Prevention of Significant Deterioration program, although certain netting calculations described in the manual are no longer applicable. Notably, it does not list mass balance as one of the preferred methods of calculating emissions and instead highlights results from compliance tests and source tests, which is the method USDOE has used in preparing the application and HIA for DE14NWP-001.

Additionally, on January 25, 1995, US EPA published "Guidance on Enforceability Requirements for Limiting Potential to Emit through SIP and §112 Rules and General Permits" which states "Continuous emissions monitoring, especially in the case of smaller sources, is not required. "In this case, the HIA predicts that all emissions except DMM will be less than the ASIL values and no continuous monitoring system currently exists for DMM. USDOE will directly measure the values

of all four pollutants potentially exceeding de minimis values when sampling in high purge mode occurs.

Ecology recognizes that the content of these tanks is, at times, not well categorized or may be changing. The core sampling system will help address this lack of information, and the results from this sampling will better inform future permitting. Ecology must develop permits upon the best data currently available, which is the previous worst-case tank emissions data. Based upon this data, the practicality of continuous monitoring, and US EPA guidance, Ecology has determined that continuous monitoring is not necessary to demonstrate compliance with WAC 173-460. Therefore, Ecology did not revise the draft DE14NWP-001 for this comment.

Appendix A: Copies of all public notices

Public notices for this comment period:

- Public notice (focus sheet)
- Classified advertisement in the *Tri-City Herald*
- Advanced notice sent to the Hanford-Info email list
- Notice sent to the Hanford-Info email list
- Event posted on Washington Department of Ecology – Hanford's Facebook page

Public Comment Period

DEPARTMENT OF ECOLOGY
State of Washington

Nuclear Waste Program **May 2015**

Rotary Core Sampling Systems for Hanford's Tanks

The Washington State Department of Ecology invites you to comment on a change to the Hanford Site Air Operating Permit (AOP). The AOP regulates air emissions from Hanford's tank ventilation systems.

How Will the Permit Change?

The change to the AOP would allow the United States Department of Energy to install up to two rotary core sampling systems for Hanford's underground tanks.

The tanks are in Hanford's 200 East Area and 200 West Area, near the center of the Hanford Site. The tanks store high-level radioactive and chemical waste remaining from Hanford's plutonium manufacturing.

The rotary core sampling systems are needed to collect samples of solid materials in the tanks so the waste can be managed more safely.

The installation of the sampling systems would result in emissions of four toxic air pollutants. The modeled emissions are:

- Hexavalent chromium – 0.00347 pounds per year.
- N-nitrosodimethylamine – 0.0913 pounds per year.
- Ammonia – 3.83 pounds a day.
- Dimethyl mercury – 0.0000000379 pounds per year.

Dimethyl mercury levels exceed a threshold requiring further study. So Ecology is preparing a detailed toxicological analysis, and we will include the results and conditions in the issued AOP.

The formal name for this change to the Hanford Air Operating Permit is the "Approval Order for Notice of Construction." The approval order will become part of the permit.

WHY IT MATTERS

The Hanford Air Operating Permit ensures that Hanford's air emissions stay within safe limits that protect people and the environment.

Public Comment Period

May 31 – July 3, 2015

To Submit Comments

Send comments or questions by email (preferred), U.S. mail, or hand deliver them to:

Philip Gent
Department of Ecology
3100 Port of Benton Blvd.
Richland, WA 99354
Hanford@ecy.wa.gov

When the comment period closes, we will consider the comments received and revise the permit as needed. Then we will issue the revised permit and Response to Comments.

Public Hearing

A public hearing is not scheduled, but if there is enough interest, we will consider holding one. To request a hearing or for more information, contact:

Madeleine Brown
Department of Ecology
800-321-2008
Hanford@ecy.wa.gov

Special Accommodations

To request ADA accommodation for disabilities, or printed materials in a format for the visually impaired, call Ecology at 509-372-7950.

Persons with impaired hearing may call Washington Relay Service at 711.

Publication Number: 15-05-005 5/15

Information Repositories and other document review locations

Online
www.ecy.wa.gov/programs/nwp/commentperiods.htm

Richland
Ecology's Nuclear Waste Program
Resource Center
3100 Port of Benton Blvd.
Richland, WA 99354
Contact: Valarie Peery
509-372-7950
Valarie.Peery@ecy.wa.gov

Dept. of Energy Administrative Record
2440 Stevens Drive, Room 1101
Richland, WA 99354
Contact: Heather Childers
509-376-2530
Heather_M_Childers@rl.gov

Department of Energy Reading Room
2770 Crimson Way, Room 101L
Richland, WA 99354
Contact: Janice Scarano
509-372-7443
DOE.reading.room@pnnl.gov

Portland
Portland State University
Branford Price Millar Library
1875 SW Park Avenue
Portland, OR 97207
Contact: Claudia Weston
503-725-4542
Westonc@pdx.edu

Seattle
University of WA Suzzallo Library
P.O. Box 352900
Seattle, WA 98195
Contact: Cass Hartnett
206-685-3130
Cass@uw.edu

Spokane
Gonzaga University Foley Center
502 E Boone Avenue
Spokane, WA 99258
Contact: John S. Spencer
509-313-6110
spencer@gonzaga.edu

Information for Public Review

Ecology invites you to review and comment on the documents for our decision to change the permit.

- The application letter
- The draft approval order, conditions, and restrictions
- State Environmental Policy Act documentation

These documents can be found online or at the locations listed in the box on the left.

Air Pollution Regulations

Ecology is following Washington Administrative Code 173-400, General Regulations for Air Pollution Sources, to process the U.S. Department of Energy's request to change the permit.

Washington Administrative Code Section 173-400-171 covers how we conduct this public comment period. It outlines when, where, and how we notify the public and provide the proposal for review.

Permittee/Site Owner

U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, WA 99352

A Hanford tank farm as it appears today. Tanks are underground.

Publication Number: 15-05-005

Classified Legals

The Washington State Department of Ecology invites you to comment on a modification to a air emission permit for Hanford tank farm ventilation units.

The public comment period runs from May 31 to July 3, 2015.

The formal name for this change is the "Approval Order for Notice of Construction." The approval order will ensure that Hanford's air emissions stay within safe limits that protect people and the environment, and allow solid materials in the tanks to be collected for sampling, so it can be managed more safely

The change to the AOP would allow the United States Department of Energy to install up to two rotary core sampling systems for Hanford's underground tanks.

The tanks are in Hanford's 200 East Area and 200 West Area, near the center of the Hanford Site. The tanks store high-level radioactive and chemical waste remaining from Hanford's plutonium manufacturing.

The installation of the sampling systems would result in emissions of four toxic air pollutants. The modeled emissions are:

- Hexavalent chromium - 0.00347 pounds per year.
- N-nitrosodimethylamine -0.0913 pounds per year.
- Ammonia - 3.83 pounds a day.
- Dimethyl mercury - 0.0000000379 pounds per year

Dimethyl mercury levels exceed a threshold requiring further study. So Ecology is preparing a detailed toxicological analysis, and we will include the results and conditions in the issued approval order.

Decision Process
When the comment period closes, Ecology will consider the comments received and revise the permit as needed. Then we will issue the Approval Order and Response to Comments. The approval order will become part of the permit during a future update.

The Permittee/Site Owner is U.S. Department of Energy Office of River Protection, P.O. Box 450, Richland, WA 99352

To submit comments, send comments or questions by email (preferred) to Hanford@ecy.wa.gov. You also can send them via U.S. mail, or hand deliver them to:
Philip Gent
Department of Ecology
3100 Port of Benton Blvd.
Richland, WA 99354

Public meeting.A public hearing is not scheduled, but if there is enough interest, we will consider holding one. To request a hearing or for more information, contact:
Dieter Bohrmann
Department of Ecology
800-321-2008
Hanford@ecy.wa.gov

Information for Public Review
Ecology invites you to review and comment on the documents for our decision to change the permit.

- The application letter
- The draft approval order, conditions, and restrictions=
- State Environmental Policy Act documentation

These documents are at the locations listed below.

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Ecology is following Washington Administrative Code 173-400, General Regulations for Air Pollution Sources, to process the U.S. Department of Energy's request to change the permit.

Washington Administrative Code Section 173-400-171 covers how we conduct this public comment period. It outlines when, where, and how we notify the public and provides the proposal for review.

Information Repositories and other document review locations
Online www.ecy.wa.gov/programs/nwp/commentperiods.htm

Richland
Ecology's Nuclear Waste Program Resource Center
3100 Port of Benton Blvd.
Richland, WA 99354
Contact: Valarie Peery
509-372-7950
Valarie.Peery@ecy.wa.gov

Dept. of Energy
Administrative Record
2440 Stevens Drive,
Room 1101
Richland, WA 99354
Contact: Heather Childers
509-376-2530
Heather_M_Childers@rl.gov

Department of Energy
Reading Room, Room 101L
2770 Crimson Way,

Richland, WA 99354
Contact: Janice Scarano
509-372-7443DOE.reading.room@pnnl.gov

Portland
Portland State University
Branford Price
Millar Library
1875 SW Park Avenue
Portland, OR 97207
Contact: Claudia Weston
503-725-4542
Westonc@pdx.edu

Seattle
University of WA
Suzzallo Library
P.O. Box 352900
Seattle, WA 98195
Contact: Cass Hartnett
206-685-3130
Cass@uw.edu

Spokane
Gonzaga University
Foley Center
502 E Boone Avenue
Spokane, WA 99258
Contact: John S. Spencer
509-313-6110
spencer@gonzaga.edu
#15-8789 5/31/2015

From:	Brown, Madeleine (ECY)
To:	hanford-Info@listserv.wa.gov
Subject:	advance notice for air-permit-related comment period
Date:	Thursday, September 18, 2014 12:49:00 PM

This is a message from the Washington Department of Ecology

Ecology plans a 30-day public comment period starting in late October or early November for a "Notice of Construction Approval Order" for a change to Hanford's Air Operating Permit.

The change is for the U.S. Department of Energy Office of River Protection to install up to two rotary core sampling systems for Hanford's underground waste storage tanks. The core sampler is needed to collect samples of solid materials in the tanks for analysis, so they can be managed more safely in the tanks and eventually the Waste Treatment Plant. The waste characterization also supports a Tri-Party Agreement requirement for closing single-shell tank farms.

The emissions from the sampling systems will be lower than the thresholds that trigger a public comment period, but since there is much interest in vapors at Hanford's tank farms, Ecology chose to hold this comment period.

More information on the proposed change will be available on Ecology's website, the Hanford Public Information Repositories, and other document review locations when the public comment period starts.

Contact Hanford@ecy.wa.gov or 800-321-2008 for more information.

From:	Brown, Madeleine (ECY)
To:	hanford-Info@listserv.wa.gov
Subject:	Comment periods underway!
Date:	Monday, June 1, 2015 3:22:00 PM

Washington's Department of Ecology invites you to comment on proposed changes for air emissions from Hanford's tank farms. The formal name of the changes is "Approval Order for Notice of Construction," and two separate change packages are open for public comment.

The comment periods run May 31 through July 3, 2015.

Proposed Changes

Rotary Core Sampling Systems for Hanford's tank farms

The change would allow the US Department of Energy Office of River Protection (permittee) to install up to two rotary core sampling systems for Hanford's underground tanks. The rotary core sampling systems are needed to collect samples of solid materials in the tanks so the waste can be managed more safely.

Please send comments by email (preferred), U.S. Mail, or hand deliver them by July 3 to:

Philip Gent
3100 Port of Benton Blvd.
Richland, WA 99354
Hanford@ecy.wa.gov

Air Permit Changes to Begin Waste Retrieval from Hanford Tank AY-102

In support of retrieving waste from Tank AY-102, the permittee wants to remove a broken piece of equipment that is restricting air flow in the tank's ventilation system.

The permittee also wants to add an exhauster to the space between the inner and outer tanks (annulus space). This exhauster will cool the inner tank's outer surface and send any airborne particulates in the annulus space through high-efficiency particulate air (HEPA) filters.

Two U.S. Department of Energy offices are applying jointly for the permit. The Richland Operations Office has the lead.

Please send comments by email (preferred), U.S. Mail, or hand deliver them by July 3 to:

Philip Gent
3100 Port of Benton Blvd.
Richland, WA 99354
HanfordAir@ecy.wa.gov

A public hearing is not scheduled, but if there is enough interest, we will consider holding one. To ask for a hearing or for more information, contact:

Dieter Bohrmann
509-372-7950
Hanford@ecy.wa.gov

You can review the proposed changes and supporting information at Ecology's Nuclear Waste Program **website**.

The proposal and supporting info are also at the Hanford Public Information Repositories.

Ecology's Hanford Education & Outreach Network

Published by Madeleine C. Brown [?] · 15 hrs ·

You can comment on two air emission change comment periods that started Sunday and run through July 3. Visit our comment periods website to learn more.
http://www.ecy.wa.gov/programs/nwp/commentperiods.htm

NWP Public Comment Periods

For more information on any of the comment periods, email hanford@ecy.wa.gov or call the Hanford Cleanup line at 800-321-2008. In addition to what's available on our website, documents open for public comment are available at the Hanford Information

ECY.WA.GOV

28 people reached

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Appendix B: Copies of all written comments

June 24, 2015

Mr. Philip Gent
Department of Ecology
3100 Port of Benton Blvd.
Richland, WA 99354

SENT CERTIFIED MAIL: 7014 0150 0001 6882 8801

Mr. Matthew Kadlec, Toxicologist
Department of Ecology
300 Desmond Drive SE
Lacey, WA 98503

Re: Public comments, draft order DE14NWP-001

Dear Mr. Gent and Mr. Kadlec:

Enclosed are my comments on draft order of approval DE14NWP-001, approving operation of the Core Sampling System in High Purge Gas Mode. These comments generally note that Ecology has yet to consider findings in the *Hanford Tank Vapor Assessment Report*[1] (TVAR) relative to and transient spikes in emission concentrations from Hanford's tanks and the increase in concentrations of toxic constituents in tank emissions accompanying waste-disturbing activities.

The TVAR bears a publication date of October 30, 2014. The Washington State Attorney General found the TVAR so credible that less than one (1) month later, on November 19, 2014, he served the U.S. Dept. of Energy, and its contractor, Washington River Protection Solutions, with a Notice of Endangerment and Intent to Sue (NOI) to protect worker health and safety at Hanford.

> On Oct. 30, 2014, an independent panel of experts issued the federally-funded Hanford Tank Vapor Assessment Report which determined that "ongoing emission of tank vapors, which contain a mixture of toxic chemicals, is inconsistent with the provisions of a safe and healthful workplace free from recognized hazards." They further found that the data "strongly suggests a causal link between chemical vapor release and subsequent adverse health effects experienced by tank farm workers."[2]

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[1] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014., at 27. Available at: http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf

[2] *See:* http://www.atg.wa.gov/pressrelease.aspx?id=32430#.VG0MuzTF8a8, news release dated Nov. 19, 2014

The TVAR has also been available to Ecology since October 30, 2014. A paper copy of the TVAR was hand-delivered to Ecology on April 22, 2015, as an enclosure to public comments on Revision B of Hanford's air operating permit. However, there is no visible indication Ecology has considered its findings. While the TVAR addresses emissions in the context of worker exposures, the emissions causing harm to workers are the very same emissions that sampling in past Ecology Orders should have detected. Had sampling requirements in past Orders been adequate, these harmful emissions would have been known; harm to the Hanford workers could have been avoided; and there would have been no reason for the Attorney General's NOI.

Core sampling and characterization of Tank waste is a necessary step in the process to safely remove and immobilize waste from the Tanks. One goal of the core sampling should, therefore, be the accurate characterization of emissions. Absent adequate characterization of core sampling emissions it is not possible to determine emissions expected during follow-on waste retrieval operations. Any assessment of harm to the public from exposure to toxic emissions from Tank Farm activities needs to be based on accurate emission information. This information must consider transient spikes and the huge increase in concentrations of toxic constituents in tank emissions accompanying waste-disturbing activities. Such information cannot be obtained when Ecology's sampling requirements do not specify: 1.) the number of samples required; 2.) when in the core sampling process these samples are to be taken; 3.) the frequency with which the sampling is to occur; and 4.) where sample analyses were limited to a small fraction of regulated TAPs based on incomplete past characterization, which is now acknowledged. Using sampling contemplated in draft Order DE14NWP-001 only perpetuates the current level of ignorance regarding tank emissions and deprives Ecology of accurate emissions data with which to determine risk to the public.

I hope Ecology finds my comments useful.

Regards,

Bill Green
424 Shoreline Ct.
Richland, WA 99354

Enclosure

Comment 1: (Incomplete application) **Require the permittee to revise and resubmit its application for approval to operate the Core Sampling System in High Purge Gas Mode and, as warranted, revise and resubmit its Second Tier Analysis request.**

In its application the permittee boasts of using the "worst case" tank as a basis for estimating emissions expected from core sampling in high purge gas mode. ("Each tank was assumed to have the highest per-tank emission rate for each pollutant; essentially each tank is considered to be a "worst case" tank."[1] and "The highest emission rate for each TAP, drawn from all tanks in the 200 Area East and West Tank Farm Facility, was used to establish a "worst case" tank."[2]) However, it appears the applicant overlooked analyses of samples taken from Tank C-101. These samples were taken before the start of waste retrieval operations, at the start of waste retrieval, and mid-way through the waste retrieval operation. These pre-start, start, and mid-way analyses reveal an increase of more than 900% of the *occupational exposure limit* for emissions of Mercury; an increase of more than 2,300% of the *occupational exposure limit* for emissions of N-Nitrosodiethylamine; an increase of more than 64% of the *occupational exposure limit* for emissions of Formaldehyde; and an increase of more than 18% of the *occupational exposure limit* for emissions of Ammonia.[3]

Even under passive ventilation there can be huge spikes in emission concentrations over a short period of time. In examining continuously monitored emission data from single shell tank (SST) SX-103 the experts found that, over about an hour concentration spikes of "over 40,000 ppb of organic compounds with the isobutylene response factor."[4] [The experts noted that "[t]he point of [the] illustration is not to comment on the potential health effects of the [isobutylene] spike shown but rather to underscore the reality of transient peaks in the release rate from tank vents. . . we saw no indication that isobutylene is a component of the head space mixture; rather it was used to calibrate the direct reading instrument."[5]]

These massive increases need to be considered in determining the "worst case" emission rate for each TAP. Emissions measured from the core sampling of tank waste will very likely be used to estimate emissions from waste retrieval operations and also as a basis for estimating public exposure. Any assessment of harm to the public from exposure to emissions from Tank Farm activities needs to be based on accurate emission information.

According to WAC 173-400-111 (1)(b) "A complete application contains all the information necessary for processing the application. At a minimum, the application must provide information on the nature and amounts of emissions to be emitted by the proposed new source or increased as part of a modification,. . . " . Missing from this application is head space characterization information that accurately captures chemicals in the head space and their concentrations and accounts for transient wafting plumes of chemical vapors in relatively high concentrations.

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[1] Washington River Protection Solutions LLC, *Criteria & Toxics Air Emissions Notice of Construction for the Operation of the Core Sampling System in High Purge Gas Mode*, TOC-ENV-NOC-0004, Rev. 1, Jun. 2014, at 1

[2] *Id.* at 6

[3] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014., at 27. (This federally-funded report was prepared by an independent panel of experts, commissioned

through the Savannah River National Laboratory. Available at: http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf)
Based on this report Attorney General Bob Ferguson sent a Notice of Endangerment and Intent to Sue the U.S. Dept. of Energy, and its contractor, Washington River Protection Solutions, for failure to control hazardous chemical vapors that continue to jeopardize worker health and safety.
[4] *Id.* at 26, citation omitted
[5] *Id.*

Comment 2: **Revise the Health Impact Assessment[1] (HIA) to reflect values reported in September, 2014, by the U.S. Department of Energy for n-Nitrosodiethylamine and Mercury [Elemental] from certain single shell tanks (SSTs).**

Ecology's HIA concludes, in part:

> "There is no evidence that exposure to NCSS [new core sampler system] DMM [dimethyl mercury] emissions, alone or in combination with additional exposure to other DMM sources, will pose health hazards to people in any publicly accessible area near Hanford."
> Air Quality Program, Washington State Department of Ecology, *Health Impact Assessment Recommendation Document for Operation of the High Purge Gas Mode Core Sampler, Hanford Site, Benton County, Washington*, Olympia, WA, Nov. 24, 2014. At 5

and:

> "Based on review of the technical analyses provided by USDOE/WRPS, and provided the NCSS are operated as proposed, their additional health risks are be permissible under Chapter 173-460-090 WAC." (emphasis added) *Id.*

However, the Second Tier Petition and resulting HIA overlook the recent ASIL exceedence from the SSTs for n-Nitrosodiethylamine and Mercury [Elemental] discussed in a September 17, 2014, email exchange between Ecology employees Matthew Kadlec and Philip Gent. Quoting from that email exchange:

> "It looks like USDOE/WRPS performed some sort of dispersion modeling on emissions of the TAPs they detected. They report none would cause a concentration greater than 1.6% of its ASIL: . . . **However, that appears to be incorrect** because the dispersed AN Farm [n-Nitrosodiethylamine] is 1559% of its ASIL and [Mercury, Elemental] is 111% of its ASIL -- Both assuming appropriate averaging periods and dispersed concentrations were outside the Hanford boundary." (emphasis retained from original) E-mail from Kadlec, Matthew (Ecology) to Gent, Philip (Ecology) *RE: TOC-ENV-NOT-2014-4017 Toxic Air Pollutants Identified from AN, AW, and AY/AZ Tank Farms* (Wednesday, September 17, 2014 1:08:01 PM)

Emissions **outside the Hanford Boundary** of 1559% of the ASIL for n-Nitrosodiethylamine and 111% of the ASIL for Elemental Mercury fall well above values considered in the HIA and well above emissions permissible under WAC 173-460-090.

Mercury is a *hazardous air pollutant* (HAP) regulated under section 112 of the federal *Clean Air Act*. Limits for Mercury are codified in the *National Emission Standards for Hazardous Air Pollutants* (NESHAPs). Ecology is likely bared from waiving federal limits using any process, including the Second Tier Petition process, codified in a Washington State regulation.

[1] Air Quality Program, Washington State Department of Ecology, *Health Impact Assessment Recommendation Document for Operation of the High Purge Gas Mode Core Sampler, Hanford Site, Benton County, Washington*, Olympia, WA, Nov. 24, 2014

Comment 3: (Ecology's HIA) **Revise Ecology's HIA to account for the highest levels of exposure to Mercury emissions expected from a bolus event. The bolus exposure event was theorized by an independent panel of experts and substantiated by computer modeling. Such modeling indicated "that under certain weather conditions, concentrations approaching 80% of the head space concentration could exist 10 feet downwind from the release point . . ."[1]. Adding active ventilation and disturbing the tank contents, as the subject core sampling envisions, could increase the magnitude of these transient peaks for Mercury emissions by more than nine hundred percent (900%) of the *occupational exposure limit.*[2] Ecology should use emission data from the best science to determine risk to the public. (The *Hanford Tank Vapor Assessment Report* examines two conditions, quiescent and disturbed. The subject core sampling with use of exhausters does not appear to qualify as quiescent.)**

[1] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014. Available at: http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf
[2] *Id.* at 27

Comment 4: (Findings 10, 11, & 12) **Order Findings 10, 11, and 12 should be discounted because they are based on monitoring and sampling that did not consider short-term bolus events. An independent panel of experts determined these bolus events can result in ". . . concentrations approaching 80% of the head space concentration [ ] 10 feet downwind from the release point . . ."[1] These experts further concluded that "[m]onitoring and sampling policy [at Hanford's Tank Farms] appears to be inadequate with respect to detecting short-term episodic exposure. The current policy does not address the potential for wafting plumes or puffs of chemical vapors in relatively high concentrations, which may be occasional and isolated in nature."[2] Giving credence to Findings 10, 11, & 12 only perpetuates use of knowingly-inaccurate emission information for TAPs. Using this inaccurate emission information will result in under-estimating actual emissions from the core sampling project.**

1 W.R. Wilmarth et al., Hanford Tank Vapor Assessment Report, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014, at 9
2 *Id.* at 30

Comment 5: (conditions 1.1.2, 1.3.3, and 3.2) **Require continuous sampling for all TAPs identified in Table 1 of this Order. Sampling should begin immediately before the core sampler enters the tank, continue during sampling operations, and remain in effect until immediately after the core sampling unit is removed from the tank. Current sampling requirements overlooks flaws identified in the *Hanford Tank Vapor Assessment Report*[1](TVAR).**

Only continuous sampling can detect extreme fluctuations in emissions resulting from addition of active ventilation and disturbing of the tank waste. An independent panel of experts evaluated Hanford tank emissions and determined significant transient peaks occur during waste-disturbing activities.[2] The experts examined analyses of samples taken from Tank C-101 before waste transfer, at the start of waste transfer, and

mid-way through the waste transfer operation. During these periods, Mercury emissions increased more than 900% of the *occupation exposure limit*; emissions of N-Nitrosodimethylamine (NDMA) increased more than 2,300% of the *occupational exposure limit*; Formaldehyde emissions increased slightly more than 64% of the *occupational exposure limit*[3]. The ill-defined sampling for TAPs contemplated in this Order would almost certainly overlook such transient peaks. These transient peaks need to be considered when determining risk to the public from core sampling and any follow-on waste retrieval.

Condition 1.3.3 requires time-weighted-averaging for determining emission. However, the independent panel of experts found "[a] time weighted average concentration of less than 10 ppm can be thousands to tens of thousands of ppm when delivered as a bolus."[4]; and, ". . . using a time-weighted average (TWA) can allow a brief but concentrated bolus exposure to go undocumented."[5] Furthermore, emissions exiting the exhauster have been diluted during the sampling process. The TVAR notes:

> "[The sampling] program should not rely on stack or exhauster sampling results to understand the possible releases as these samples represent mixtures of tank contents exhausted through a mutual stack or exhauster that have been diluted during the process. The concentrations are not meaningfully applied to a fugitive emission source from a single tank." [6]

and:

> "Waste disturbing activities can greatly alter the concentration and composition of the head space gases and vapors. Past head space characterization did not evaluate the effect of waste disturbing activities on the chemicals in the head space and their concentrations." [7]

It is the vapor and gas exiting the tank through the HEPA filters that harms workers and provides inputs to models used for assessing health impacts to the public. Accurately identifying these chemicals, their respective concentrations, and maximum releases are essential in determining such impacts.

Whether an ASIL has been exceeded (condition 1.1.2) can only be determined by considering bolus events. Using an averaging scheme that fails to account for conditions where ". . . concentrations approaching 80% of the head space concentration could exist 10 feet downwind from the release point . . ."[8] cannot accurately assess whether an ASIL has been exceeded.

Condition 1.1.2 states "[a]ll TAPs, as submitted in the Permittee's Notice of Construction Application (Table 1), shall be below their respective ASIL or approved through a Second Tier review." Table 1 contains roughly ninety (90) TAPs. Yet, condition 3.2 requires sampling and analysis for only four (4) TAPs. Past sampling activities have not captured either an accurate composition of head space gases or an accurate concentration.

> "The materials originally present [in the tanks] are subject to complex thermal and radiolytic reactions that vastly increased the compound classes and individual compounds present. It is the head space composition that determines the composition of the vent, stack, and most fugitive emissions. . . . Waste disturbing activities can greatly alter the concentration and composition of the head space gases and vapors. Past head space characterization did not evaluate the effect of waste disturbing activities on the chemicals in the head space and their concentrations."[9]

Concentrations for TAPs derived from past sampling cannot be relied upon to accurately represent actual emissions of these TAPs during sampling process[10]. Sampling and analysis should include all reported TAPs. Ecology's findings are in error, absent accurate emission information.

Condition 3.2 also does not specify: 1.) the number of samples required; 2.) when in the core sampling process these samples are to be taken; and 3.) the frequency with which the sampling is to occur. The independent panel of experts has already determined that a single sample is insufficient to accurately measure vapors and gases that freely pass through the HEPA filter. They recommend head space be sampled and characterized during a range of conditions, from quiescent to disturbed.

> "This investigation should involve an initial sampling and analysis campaign to update the characterization of the tank head spaces during both quiescent and disturbed conditions, as well as an ongoing campaign to routinely collect head space data. The ongoing campaign should include sampling the head space during every tank sampling event, and analyzing the head space samples as appropriate to the frequency of such sampling. Characterization of releases from the tank head spaces should be further differentiated on the basis of whether the release would be expected to be diluted, as is the case for stack exhaust during active ventilation, or undiluted, as is the case for releases through passive vents or fugitive pathways. It is imperative to account for the unusual operating scenarios when planning to prevent the unusual exposure incidents."[11]

Continuous sampling should be required beginning immediately before the core sampler enters the tank, continuing during sampling operations, and remaining until immediately after the sampling unit is removed from the tank. Current sampling requirements overlook flaws identified in the TVAR.

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[1] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014. Available at: http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf
[2] *Id.* at 27
[3] *Id.*
[4] *Id.* at 35
[5] *Id.*
[6] *Id.* at 16-17
[7] *Id.* at 23
[8] *Id.* at 9
[9] *Id.* at 23
[10] The permittee's application errors when it states waste will not be disturbed during the act of core sampling. *See* application pg. 6.
[11] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014, at 28

Comment 6: (Conditions 1.1.3, 1.3.4, and 3.1) **Require continuous sampling for Ammonia. Sampling should begin immediately before the core sampler enters the tank, continue during sampling operations, and remain in effect until immediately after the core sampling unit is removed from the tank. Current sampling requirements overlook flaws identified in the TVAR[1].**

Only continuous sampling can detect extreme fluctuations in emissions resulting from addition of active ventilation and disturbing of the tank waste. An independent panel of experts evaluated Hanford tank emissions and determined significant transient peaks occur during waste-disturbing activities.[2] The experts examined analyses of samples taken from Tank C-101 before waste transfer, at the start of waste transfer, and mid-way through the waste transfer operation. During these periods, Ammonia emissions increased more than 18% of the *occupation exposure limit*[3]. The ill-defined

sampling for Ammonia contemplated in this Order would almost certainly overlook such transient peaks. These transient peaks need to be considered when determining risk to the public from core sampling.

Condition 1.1.3 requires that "Ammonia emissions from the project shall not exceed 3.83 pounds per day on exhausters that are not permitted under Approval Order DE11NWP-001, Rev 1." Condition1.3.4 requires sampling be used to determine a daily release rate. Condition 3.1 requires sampling occur using Draeger tubes, and that "[s]tack flow rate and temperature [] be applied with the ammonia stack gas concentration to report ammonia emission in terms of pounds per day." The resultant "pounds per day" is thus a time weighted average.

The Ammonia sampling scheme used in this Order overlooks findings in the TVAR, a federally-funded report prepared by an independent panel of experts, who determined that "ongoing emission of tank vapors, which contain a mixture of toxic chemicals, is inconsistent with the provisions of a safe and healthful workplace free from recognized hazards."[4] (The experts further found the data "strongly suggests a causal link between chemical vapor release and subsequent adverse health effects experienced by tank farm workers."[5]) The experts theorized that "under certain weather conditions, concentrations approaching 80% of the head space concentration could exist 10 feet downwind from the release point . . ."[6] . They substantiated their theory by modeling[7] and by results of monitoring instrument calibration gas in Tank SX-103[8]. The experts further observed that:

> "[m]onitoring and sampling policy appears to be inadequate with respect to detecting short-term episodic exposure. The current policy does not address the potential for wafting plumes or puffs of chemical vapors in relatively high concentrations, which may be occasional and isolated in nature."[9]

and:

> "The adverse health effects, e.g., upper respiratory irritation, are not representative of chronic exposures resulting from the current interpretation of personnel monitoring data (that is, eight-hour time-weighted averages) but are the result of transitory exposures to relatively high concentrations of chemicals."[10]

While the experts' findings pertain to toxic exposures suffered by some Hanford workers, these same emissions are used by modelers to predict risk to the public. The endemic under-characterization of vapors and gases and their relatively high concentrations in these transitory events also have the potential to harm the public.

With regard to time weighted averaging, which is contemplated by this Order, the experts stated:

> "[A] time weighted average concentration of less than 10 ppm can be thousands to tens of thousands of ppm when delivered as a bolus."[11]

and:

> ". . . using a time-weighted average (TWA) can allow a brief but concentrated bolus exposure to go undocumented."[12]

Thus, time weighted averaging of one or a few samples from a Draeger tube can greatly underestimate the concentration of the actual emissions.

Condition 3.1 does not specify: 1.) the number of samples required; 2.) when in the core sampling process these samples are to be taken; and 3.) the frequency with which the sampling is to occur. The independent panel of experts has already determined that a

single sample is insufficient to accurately measure vapors and gases that freely pass through the HEPA filter. They recommend head space be sampled and characterized during a range of conditions, from quiescent to disturbed.

> "This investigation should involve an initial sampling and analysis campaign to update the characterization of the tank head spaces during both quiescent and disturbed conditions, as well as an ongoing campaign to routinely collect head space data. The ongoing campaign should include sampling the head space during every tank sampling event, and analyzing the head space samples as appropriate to the frequency of such sampling. Characterization of releases from the tank head spaces should be further differentiated on the basis of whether the release would be expected to be diluted, as is the case for stack exhaust during active ventilation, or undiluted, as is the case for releases through passive vents or fugitive pathways. It is imperative to account for the unusual operating scenarios when planning to prevent the unusual exposure incidents."[13]

Continuous sampling for Ammonia should be required beginning immediately before the core sampler enters the tank, continuing during the core sampling operations, and remaining until immediately after the core sampling unit is removed from the tank. Current sampling requirements overlook flaws identified in the TVAR.

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[1] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014. Available at: http://srnl.doe.gov/documents/Hanford_TVAT_Report_2014-10-30-FINAL.pdf
[2] *Id.* at 27
[3] *Id.*
[4] *Id.* at 15
[5] *Id.*
[6] *Id.* at 9
[7] *Id.*
[8] *Id.* at 26
[9] *Id.* at 30
[10] *Id.* at 15
[11] *Id.* at 35
[12] *Id.*
[13] *Id.* at 28

Comment 7: (Finding 16, conditions 1.2.3, and 1.3.6) **Because toxic vapors and gases freely pass through pre-filters and nuclear grade HEPA filters[1], and because it is these toxic vapors and gases that have the potential to impact the public, the core sampler exhaust should be equipped with continuous monitors (including CAMs for radioactive vapors and gases) to help quantify emissions at the point of entry into the atmosphere.**

Absent the ability to use mass balance to predict emissions, it is standard practice to monitor emissions from a point source at, or very close to, the point of entry into the environment. Following standard practice will provide the best emission information for determining risk to the public from planned follow-on activities, such as waste retrieval.

Emissions from Tank head space cannot accurately be predicted using mass balance calculations because both the composition of head space gases and tank wastes are extremely variable. The panel of experts observed that:

> "The Hanford tank waste is a complex matrix of aqueous soluble and insoluble inorganic salts combined with an inventory of water and organic components that number into the thousands.

> These organic components are constantly undergoing radiolysis from the tank radioactivity plus thermal and chemical reactions with tank contents." [2]

and:

> "The [Tank] waste material is radioactive, continually generating heat, continually catalyzing both known and unknown chemical reactions in all layers, and continually generating gases and known and unknown chemical products that are continuously created and destroyed via chemical, thermal, radiocatalytic and radiolytic processes in all layers."[3]

and:

> "The materials originally present are subject to complex thermal and radiolytic reactions that vastly increased the compound classes and individual compounds present. It is the head space composition that determines the composition of the vent, stack, and most fugitive emissions. . . . Waste disturbing activities can greatly alter the concentration and composition of the head space gases and vapors."[4]

Given the dynamic nature of Tank waste and head space gases the only viable avenue for determining the composition and concentration of toxic vapors and gases exiting the HEPA filter is direct measurement. Because the concentration of chemicals in the head space gases and release rates can rapidly change due to bolus events, only continuous monitoring can assure that the toxic vapors and gases entering the environment are accurately accounted for.

> ". . . under certain weather conditions, concentrations approaching 80% of the head space concentration could exist 10 feet downwind from the release point . . . ." [5]

and:

> "[T]he mixture of chemicals is not simple, consistent, or well characterized. The tank vapor sources present variable composition and are unpredictable in location, direction and duration." [6]

and:

> "In briefings received by the TVAT while visiting the Hanford site, it was reported that transient spikes are observed in vapor concentrations at the beginning of retrieval operations. This observation calls into question assumptions of the head space being well mixed and head space composition being constant over time. It further calls into question any assumption that sampling during quiescent conditions would be reasonably representative of conditions while the waste materials are being disturbed. We understand that the transient spikes were reported to be as much as three orders of magnitude[a] greater than the baseline quiescent levels."[7]

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[a] "[A]n increase of one order of magnitude is the same as multiplying a quantity by 10." An increase of three orders of magnitude is the equivalent of multiplying by 1,000, or 10^3." (http://whatis.techtarget.com/definition/order-of-magnitude)

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[1] W.R. Wilmarth et al., *Hanford Tank Vapor Assessment Report*, SRNL-RP-2014-00791, Rev.0, Oct. 30, 2014, at 22
[2] *Id.* at 16
[3] *Id.* at 21
[4] *Id.* at 23
[5] *Id.* at 9
[6] *Id.* at 33
7 *Id.* at 26

References

Exhibit 1: *Approval Order DE11NWP-001, Revision 3, Pages 16 through 19.*

Table 6: Toxic Air Pollutants from the 241-SY, 241-AP, and 241-AY/AZ Ventilation Systems (DE11NWP-001, Rev. 3)

Chemical Name	CAS #	Avg. Period	Emissions (g/s)	Emissions (lbs/avg period)	SQER (lbs/ avg. period)	ASIL (µg/m³)	Dispersed Conc. (µg/m3)
Ethylbenzene	100-41-4	Year	1.41E-03	9.81E+01	76.8	1.06E-04	0.4
Styrene	100-42-5	24-hr	4.62E-04	8.81E-02	118	6.94E-04	900
Benzyl Chloride	100-44-7	Year	1.34E-05	9.32E-01	3.91	1.01E-06	0.0204
Nitrogen dioxide	10102-44-0	1-hr	5.51E-02	4.38E-01	1.03	8.82E-01	470
n-Nitroso-n-methylethylamine	10595-95-6	Year	1.94E-06	1.35E-01	0.0305	1.45E-07	0.000159
p-Xylene	106-42-3	24-hr	1.63E-03	3.10E-01	29	2.44E-03	221
1,4-Dichlorobenzene	106-46-7	Year	6.21E-05	4.32E+00	17.4	4.66E-06	0.0909
1,2-Epoxybutane	106-88-7	24-hr	4.04E-05	7.69E-03	2.63	6.06E-05	20
1,2-Dibromoethane	106-93-4	Year	7.97E-05	5.54E+00	2.71	5.98E-06	0.0141
1,3-Butadiene	106-99-0	Year	1.99E-04	1.39E+01	1.13	1.49E-05	0.00588
Acrolein	107-02-8	24-hr	2.98E-06	5.68E-04	0.00789	4.47E-06	0.06
Allyl Chloride	107-05-1	Year	1.02E-05	7.09E-01	32	7.64E-07	0.167
1,2-Dichloroethane	107-06-2	Year	1.63E-03	1.13E+02	7.39	1.22E-04	0.0385
Acrylonitrile	107-13-1M	Year	1.23E-05	8.56E-01	0.662	9.24E-07	0.00345
Vinyl acetate	108-05-4	24-hr	4.48E-07	8.53E-05	26.3	6.72E-07	200
Methyl Isobutyl Ketone	108-10-1	24-hr	2.77E-03	5.27E-01	394	4.15E-03	3000
m-Xylene	108-38-3M	24-hr	9.42E-04	1.79E-01	29	1.41E-03	221
3-Methylphenol	108-39-4	24-hr	4.74E-06	9.03E-04	78.9	7.11E-06	600
Toluene	108-88-3	24-hr	4.09E-02	7.78E+00	657	6.13E-02	5000
Chlorobenzene	108-90-7	24-hr	4.99E-04	9.51E-02	131	7.49E-04	1000
Phenol	108-95-2	24-hr	8.14E-03	1.55E+00	26.3	1.22E-02	200
n-Hexane	110-54-3	24-hr	5.16E-03	9.83E-01	92	7.74E-03	700
Cyclohexane	110-82-7	24-hr	1.58E-03	3.01E-01	789	2.37E-03	6001
Ethylene glycol monoethyl ether acetate	111-76-2	24-hr	1.52E-04	2.89E-02	1710	2.27E-04	13000
Propylene	115-07-1	24-hr	3.93E-03	7.48E-01	394	5.89E-03	3000
Bis(2-ethylhexyl)phthalate	117-81-7	Year	7.46E-07	5.18E-02	8	5.59E-08	0.0417
1,4-Dioxane	123-91-1	Year	7.02E-04	4.88E+01	24.9	5.27E-05	0.13
Perchloroethylene	127-18-4	Year	1.62E-03	1.12E+02	32.4	1.21E-04	0.169
Vanadium Pentoxide	1314-62-1	1-hr	1.17E-04	9.30E-04	0.0657	1.88E-03	30
Polychlorinated Biphenyls (PCBs)	1336-36-3	Year	2.04E-05	1.42E+00	0.336	1.53E-06	0.00175

Chemical Name	CAS #	Avg. Period	Emissions (g/s)	Emissions (lbs/avg period)	SQER (lbs/ avg. period)	ASIL (µg/m^3)	Dispersed Conc. (µg/m3)
Trans-1,2-dichloroethene	156-60-5	24-hr	1.19E-07	2.27E-05	106	1.79E-07	807
Butylated hydroxyanisole	25013-16-5	Year	1.42E-06	9.89E-02	3360	1.07E-07	17.5
Formaldehyde	50-00-0	Year	2.35E-05	1.64E+00	32	1.76E-06	0.167
n-Nitrosodiethylamine	55-18-5	Year	1.94E-06	1.35E-01	0.0192	1.45E-07	0.0001
Carbon Tetrachloride	56-23-5	Year	1.64E-03	1.14E+02	4.57	1.23E-04	0.0238
1,1-Dimethylhydrazine	57-14-7	24-hr	1.74E-06	3.32E-04	0.0657	2.61E-06	0.5
Propylene Glycol	57-55-6	24-hr	2.25E-04	4.29E-02	3.75	3.38E-04	28.5
n-Nitrosomorpholine	59-89-2	Year	8.96E-06	6.23E-01	0.101	6.72E-07	0.000526
Dimethyl Mercury	593-74-8	24-hr	4.12E-08	7.85E-06	1.00E-99	6.18E-08	1.00E-99
Acetamide	60-35-5	Year	6.05E-06	4.21E-01	9.59	4.54E-07	0.05
n-Nitrosodimethylamine	62-75-9	Year	2.65E-03	1.84E+02	0.0416	1.98E-04	0.000217
n-Nitrosodi-n-propylamine	621-64-7	Year	1.94E-06	1.35E-01	0.0959	1.45E-07	0.0005
Methyl Isocyanate	624-83-9	24-hr	1.77E-06	3.37E-04	0.131	2.65E-06	1
Carbon monoxide	630-08-0	1-hr	3.73E-02	2.96E-01	50.4	5.97E-01	23000
Methyl Alcohol	67-56-1	24-hr	7.11E-02	1.35E+01	526	1.07E-01	4000
Isopropyl Alcohol	67-63-0	1-hr	3.37E-03	2.68E-02	7.01	5.40E-02	3200
Chloroform	67-66-3	Year	1.64E-03	1.14E+02	8.35	1.23E-04	0.0435
Hexachloroethane	67-72-1	Year	1.68E-03	1.17E+02	17.4	1.26E-04	0.0909
Benzene	71-43-2	Year	1.63E-03	1.13E+02	6.62	1.22E-04	0.0345
1,1,1-Trichloroethane	71-55-6	24-hr	6.74E-05	1.28E-02	131	1.01E-04	1000
Methyl Bromide	74-83-9	24-hr	6.42E-05	1.22E-02	0.657	9.62E-05	5
Methyl Chloride	74-87-3	24-hr	2.24E-04	4.26E-02	11.8	3.35E-04	90
Hydrogen Cyanide	74-90-8	24-hr	5.69E-06	1.08E-03	1.18	8.54E-06	9
Lead and compounds (NOS)	7439-92-1	Year	6.55E-05	4.56E+00	16	4.92E-06	0.0833
Manganese & Compounds	7439-96-5	24-hr	6.55E-05	1.25E-02	0.00526	9.83E-05	0.04
Mercury, Elemental	7439-97-6	24-hr	1.99E-05	3.78E-03	0.0118	2.98E-05	0.09
Arsenic & Inorganic Arsenic Compounds	7440-38-2	Year	6.55E-05	4.56E+00	0.0581	4.92E-06	0.000303
Beryllium & Compounds (NOS)	7440-41-7	Year	3.28E-06	2.28E-01	0.08	2.46E-07	0.000417

Chemical Name	CAS #	Avg. Period	Emissions (g/s)	Emissions (lbs/avg period)	SQER (lbs/ avg. period)	ASIL ($\mu g/m^3$)	Dispersed Conc. (µg/m3)
Cadmium & Compounds	7440-43-9	Year	3.28E-05	2.28E+00	0.0457	2.46E-06	0.000238
Chromium Hexavalent: Soluble, except Chromic Trioxide	7440-47-3	Year	1.00E-04	6.98E+00	0.00128	7.53E-06	6.67E-06
Cobalt	7440-48-4	24-hr	6.55E-05	1.25E-02	0.013	9.83E-05	0.1
Copper & Compounds	7440-50-8	1-hr	3.28E-05	2.61E-04	0.219	5.26E-04	100
Sulfur dioxide	9/5/7446	1-hr	2.43E-04	1.93E-03	1.45	3.88E-03	660
Ethyl Chloride	75-00-3	24-hr	2.87E-04	5.46E-02	3940	4.30E-04	30000
Vinyl Chloride	75-01-4	Year	1.64E-03	1.14E+02	2.46	1.23E-04	0.0128
Acetonitrile	75-05-8	Year	3.83E-03	2.66E+02	11500	2.87E-04	60
Acetaldehyde	75-07-0	Year	4.10E-03	2.85E+02	71	3.08E-04	0.37
Dichloromethane	75-09-2	Year	1.11E-02	7.73E+02	192	8.34E-04	1
Carbon disulfide	75-15-0	24-hr	4.01E-04	7.63E-02	105	6.01E-04	800
Ethylene oxide	75-21-8	Year	7.73E-06	5.38E-01	2.19	5.80E-07	0.0114
Bromoform	75-25-2	Year	8.76E-06	6.09E-01	174	6.57E-07	0.909
1,1-Dichloroethane	75-34-3	Year	2.72E-05	1.89E+00	120	2.04E-06	0.625
1,1-Dichloroethylene	75-35-4	24-hr	3.13E-03	5.95E-01	26.3	4.69E-03	200
Chlorodifluoromethane	75-45-6	24-hr	9.98E-04	1.90E-01	6570	1.50E-03	50000
1-Chloro-1,1-difluoroethane	75-68-3	24-hr	1.08E-03	2.06E-01	6570	1.62E-03	50000
Ammonia	7664-41-7	24-hr	1.00E+00	1.91E+02	9.31	1.50E+00	70.8
Selenium & Selenium Compounds (other than Hydrogen Selenide)	7782-49-2	24-hr	5.70E-06	1.09E-03	2.63	8.55E-06	20
1,2-Dichloropropane	78-87-5	Year	4.78E-05	3.32E+00	19.2	3.59E-06	0.1
Methyl Ethyl Ketone	78-93-3	24-hr	9.59E-03	1.83E+00	657	1.44E-02	5000
1,1,2-Trichloroethane	79-00-5	Year	5.92E-04	4.11E+01	12	4.44E-05	0.0625
Trichloroethylene	79-01-6	Year	1.63E-03	1.13E+02	95.9	1.22E-04	0.5
Acrylic Acid	79-10-7	24-hr	6.51E-04	1.24E-01	0.131	9.77E-04	1
1,1,2,2-Tetrachloroethane	79-34-5	Year	7.45E-04	5.18E+01	3.3	5.58E-05	0.0172
2-Nitropropane	79-46-9M	24-hr	1.91E-04	3.65E-02	2.63	2.87E-04	20
Hexachlorobutadiene	87-68-3	Year	1.16E-03	8.08E+01	8.73	8.71E-05	0.0455
Naphthalene	91-20-3M	Year	1.30E-05	9.03E-01	5.64	9.74E-07	0.0294
n-Nitroso-di-n-butylamine	924-16-3	Year	1.94E-06	1.35E-01	0.062	1.45E-07	0.000323

Chemical Name	CAS #	Avg. Period	Emissions (g/s)	Emissions (lbs/avg period)	SQER (lbs/ avg. period)	ASIL (µg/m³)	Dispersed Conc. (µg/m3)
n-Nitrosopyrrolidine	930-55-2	Year	1.94E-06	1.35E-01	0.32	1.45E-07	0.00167
o-Xylene	95-47-6	24-hr	1.61E-03	3.06E-01	29	2.41E-03	221
2-Methylphenol	95-48-7M	24-hr	2.85E-05	5.42E-03	78.9	4.27E-05	600
Cumene	98-82-8	24-hr	7.03E-05	1.31E-02	52.6	1.06E-04	400

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