STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
3100 Port of Benton Blvd • Richland, WA 99354 • (509) 372-7950
711 for Washington Relay Service • Persons with a speech disability can call (877) 833-6341

November 25, 2020 20-NWP-177

Jennifer Colborn
Office of River Protection
United States Department of Energy
PO Box 450, MSIN: H6-60
Richland, Washington 99354

Re: Department of Ecology's Comments on the *Draft Waste Incidental to Reprocessing Evaluation for Vitrified Low-Activity Waste Disposed of Onsite at the Hanford Site, Washington*, and on the *Performance Assessment for the Integrated Disposal Facility, Hanford Site* (DOE O 435.1 PA), RPP-RPT-59958, Rev. 1A, May 26 – November 28, 2020, Public Comment Period

Dear Jennifer Colborn:

The United States Department of Energy (USDOE) made the *Draft Waste Incidental to Reprocessing Evaluation for Vitrified Low Activity Waste Disposed of Onsite at the Hanford Site, Washington* (WIR), along with the *Performance Assessment for the Integrated Disposal Facility, Hanford Site* (IDF PA) available for a public review period, May 26 – September 26, 2020. The public review period was later extended to November 27, 2020. The Department of Ecology's (Ecology) comments on the Draft WIR and the IDF PA are enclosed.

All IDF PA and WIR comments provided during the public comment period, including those provided by Ecology and the United States Nuclear Regulatory Commission, should be resolved before a decision is made on the WIR.

In addition, given that secondary solid wastes (SSW) was a significant component in the IDF PA, Ecology was surprised that SSW resulting from Waste Treatment Plant and support facility operations were not evaluated as part of the WIR process. The WIR must include an evaluation of SSW based on the following:

- The source of SSW is the same tank waste as the Vitrified Low Activity Waste (VLAW) glass forms.
- A significant portion of the mobile, long-lived radionuclides ends up in the various SSW streams.
- The planned disposal location for SSW is the near surface of the IDF.
- SSW presents a potential risk to the groundwater.

USDOE and its contractor have requested that Ecology approve SSW as a waste stream for disposal at IDF as part of the current IDF Class 3 Dangerous Waste permit modification. In our review of this permit modification request, Ecology commented that the Permittees have not demonstrated that the SSW can be safely and lawfully disposed in a near surface disposal location. Ecology will not be able to approve the SSW for acceptance at the IDF for near surface disposal without certification from USDOE that the SSW is not High-Level Waste. Certification of SSW could be accomplished by evaluating it in this VLAW WIR and including SSW in a subsequent WIR Determination.

If you have questions or concerns, please contact Suzanne Dahl, Tank Waste Treatment Section Manager, at suzanne.dahl@ecy.wa.gov or (509) 539-3489, or Jerry Yokel, Chemist, at jerry.yokel@ecy.wa.gov or (509) 372-7937.

Sincerely,

Digitally signed by Schleif, Stephanie (ECY)

Stephanie Schleif
Acting Program Manager
Nuclear Waste Program

nw/ag

Enclosures (2)

cc: See page 3

cc electronic:

David Einan, EPA
Duane Carter, USDOE-RL
Mostafa Kamal, USDOE-RL
Gary Piles, USDOE-RL
Brian Stetter, USDOE-RL
Mary Beth Burandt, USDOE-ORP
Ty Blackford, CHPRC
Randy Havenor, CHPRC
Pat Lee, WRPS
Jon Perry, MSA
Mason Murphy, CTUIR
Jack Bell, NPT
Rex Buck Jr., Wanapum
Laurene Contreras, YN
ERWM Staff, YN
Susan Leckband, HAB
Jeff Burright, ODOE
Max Woods, ODOE
Gail Laws, WDOH
Suzanne Dahl, Ecology
Jay Decker, Ecology
Dib Goswami, Ecology
Mandy Jones, Ecology
Dan McDonald, Ecology
Stephanie Schleif, Ecology
Nancy Ware, Ecology
Jerry Yokel, Ecology
NWP RIM Coordinators, Ecology
Environmental Portal
CHPRC Correspondence Control
EPA Region 10 Hanford Field Office, Correspondence Control
Hanford Administrative Record
Hanford Facility Operating Record
MSA Correspondence Control
USDOE-RL Correspondence Control
USDOE-ORP Correspondence Control
WRPS Correspondence Control

Review Comment Record	Washington State Department of Ecology Nuclear Waste Program	Date: November 23, 2020 Page 1 of 5

Document Title(s)/Number(s):

IDF Waste Incidental to Reprocessing Draft Evaluation

Document Manager	Telephone Number	Project Manager	Telephone Number	Facility Site ID	Cleanup Site ID
Suzanne Dahl	372-7892	Dan McDonald	372-7988	IDF	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Open/ Close	Reviewer Initials
1	General	Section 1 of the PA states "the PA will be used to support decisions related to the WIR determinations." The PA is the primary tool used by USDOE to demonstrate satisfaction of the WIR evaluation criteria under DOE M-435.1-1. First, USDOE relies on the PA to demonstrate that the vitrified LAW will be processed to remove key radionuclides to the maximum extent practical. Second, USDOE relies on the PA to demonstrate that the vitrified LAW will be managed to meet safety requirements comparable to the performance objectives set forth in Title 10, CFR Part 61, Subpart C—Performance Objectives (including Protection of general population from releases of radioactivity, and protection of individuals from inadvertent intrusion). Third, USDOE relies on the PA to demonstrate that the vitrified LAW will not exceed concentration limits for Class C low-level waste as set forth in 10 CFR 61.55. The validity of the Draft WIR Evaluation is therefore dependent on the validity of the PA.	The PA comments should be fully resolved before the WIR Evaluation is finalized and a WIR Determination is made.	The PA will be used to support decisions related to the WIR determinations.			Open	JY

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Open/ Close	Reviewer Initials
2	General	This WIR Evaluation should include SSW. Ecology has noted this several times and so has the USNRC noted the need in 1) November 19, 2020 Virtual Public Meeting on NRC's Request for Additional Information and 2) NRC's November 6, 2020 letter Requesting Additional Information for the Hanford VLAW WIR.	Include solid secondary waste in this WIR evaluation.	Ecology sees that the SSW should be part of a WIR because: the SSW is from the same source as the VLAW, significant amounts of the risk driving radionuclides are partitioned to the SSW, and both VLAW and SSW will be disposed of in the same near surface landfill. If any of the SSW to be disposed of in the IDF constitutes high-level waste under the Nuclear Waste Policy Act, Ecology cannot authorize its placement in the IDF unless a valid WIR Determination has been made. Further delays in preparing a WIR for SSW may delay the permitting process for the IDF.			Open	sd
3	General	Based upon the information presented at the November 19, 2020 Virtual Public Meeting on NRC's Request for Additional Information and NRC's November 6, 2020 letter Requesting Additional Information for the Hanford VLAW WIR, Ecology requests that 1) the information provided in response to this and subsequent requests for additional information be made available on the Energy and NRC websites, and 2) Energy should adequately resolve NRC's forthcoming comments prior to issuing the final WIR evaluation.	1) Provide Energy's response to NRC's request for additional information, and 2) adequately resolve NRC forthcoming comments prior to issuing the final WIR evaluation.	Completeness, technical thoroughness, and transparency to the public.			Open	JD
4	General	The impacts beyond a 1000-year interval should be considered.	Decisions should be based on risk impacts that occur up to the 1000 years and beyond – to the timeframe that represents the peak impact.	Many of the key radionuclides are long lived and represent a risk significantly beyond 1000-year mark.			Open	sd
5	Page 2-40 (Sec. 2.2.7.1)	Section 2.2.7.1 states: "Information concerning existing groundwater contamination is provided for additional background, and is not within the scope of this Draft WIR Evaluation."		Is it possible that existing groundwater contamination will remain long enough to co-mingle with future releases from the IDF? If so, has the cumulative impact been adequately evaluated?			Open	sd

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Open/ Close	Reviewer Initials
6	Page 2-57 (Sec. 2.5.1.4)	Section 2.5.1.4 states: "The concentrated effluent from [the Effluent Management Facility's] evaporator will be sent to the LAW Vitrification Facility for vitrification." Footnote 33 states: "EMF information is included as additional background information, to describe its use to recycle LAW Vitrification Facility effluent. The EMF is outside the scope of this Draft WIR Evaluation."		These two statements appear contradictory. If the concentrated effluent from EMF is being sent back to the LAW Vitrification Facility, doesn't it follow that the vitrified form of this effluent should be included as part of the VLAW covered by this WIR Evaluation?			Open	sd
7	Page 4-3, section 4.1.4.1	Use of terms in this section and in others seems to be confusing. Post-closure compliance period, compliance vs post closure, compliance and post-compliance, and so on	Perhaps a look at consistency for terms, including definitions to aid the reader in understanding.	Different terms denoting different phases can become confusing.			Open	dm
8	Page 4-6 and following	"Maximum extent technically and economically practical" is used throughout the document; yet, there is no definitive criteria to determine thresholds for those terms. Example on this page indicates "maximum extent that is technically and economically practical will vary from situation, based on…overall costs and benefits of deploying a technology…"	Perhaps a clearer bounding of the terms, and some standard by which the decision-making process will be undertaken.	There does not seem to be a consistent frame of reference for these terms; to indicate that the decision will vary, according to overall costs and benefits doesn't lend well to validating and verifying specific criteria for decision-making. On that same page, it indicates "…contemplates, among other things…" and lists many things to be considered. There, however, is no prioritization for these issues; no consideration of interdependencies of issues, and so on.			Open	dm

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Open/ Close	Reviewer Initials
9	Page 4-12 (Sec. 4.2.2.6)	Section 4.2.2.6 states: "DOE has performed extensive studies on potential removal of technetium. Elutable IX with SuperLig® 639[53] was tested extensively in 1996 to 2003 for deployment in the original Hanford WTP. … However, because technetium will be retained by the vitrified waste form, DOE and Ecology agreed to delete technetium removal implementation from the WTP permit." Presuming that SSW becomes part of WIR- it is essential that the recycle loop be maintained to protect the SSW from becoming problematic. There also needs to be an ongoing system tracking mechanism percentage of Iodine-129 and Technetium-99 removed and remaining in all waste streams	A. Include solid secondary waste in the WIR evaluation. B. Ongoing system tracking mechanism percentage of I and TC removed and remaining in all waste streams.	Transparency to the public Energy has limited data upon which to decisively conclude that Tc-99 will be captured in the vitrified LAW waste. However, because the limited data available is promising, and due to technical and cost issues with other Tc-99 removal technologies, Ecology did agree to removal of Tc-99 from the WTP process train. In the event that less Tc-99 is captured in the vitrified LAW waste than is expected, through recycle and additions of sugar in the melter feed to promote Tc-99 reduction in the melter plenum space, there will be increased concentrations of Tc-99 in the solid secondary waste and less in vitrified LAW waste.			Open	sd
10	§4.3, 5.2, 6.3	Energy's conclusions for each of the WIR evaluation criteria are based solely upon evaluation of the vitrified LAW waste. While the vitrified LAW waste form is expected to perform well, failure to include solid secondary waste that results from treatment of the tank waste into vitrified LAW renders this analysis and associated conclusions incomplete and potentially inaccurate. Specifically, the Draft WIR Evaluation does not address whether all of the wastes associated with tank waste treatment that will be emplaced in the IDF (1) will have key radionuclides removed to the maximum extent practical, (2) will be incorporated into a solid physical form, and (3) will not exceed the applicable concentrations limits for Class C low-level waste as set forth in 10 CFR 61.55.	A. Include solid secondary waste in the WIR evaluation. B. Specifically include Tc-99 and I-129 as key radionuclides for SSW in the WIR evaluation C. Discuss the expected fate and ultimate disposition of Tc-99 and I-129 in the WTP system and discuss the associated uncertainties.	Completeness and Transparency to the public			Open	sd
11	Page 4-15, section 4.2.3	The paragraph begins "the assessment of economic practicality" contemplates …" That language is not in 435.1 language. The word "contemplate" seems to be something added to the WIR. IN addition, the "in essence…" phrasing seems to be an opinion based on…?	Please explain the rationale for the phrasing in section 4.2.3, first paragraph.	To provide frame of reference and source reach back for assertions made in this paragraph.			Open	dm

Review Comment Record	Washington State Department of Ecology Nuclear Waste Program	Date: November 23, 2020 Page 5 of 5

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Open/ Close	Reviewer Initials
12	Page 4-16, table 4-7	This data, according to the sources used, is 23+ years old.	Please explain why data this old is being used in this WIR. Certainly over the years more technically practical technologies have been developed. In addition, economically practical criteria have likely changed.	In 23 years, it is highly likely that frames of reference for technologies and costs have changed. Using the most up to date information will increase the credibility and viability of the document.			Open	Dm
13	Page 4-18, section 4.3, conclusions	On the assumption that table 4-7 and thus 4-8 are out of date, then the assertions made in section 4.3 may not be necessarily true to the extent implied.	Further data analyses with more up to date data to ensure that the assertions made are credible.	In 23 years, it is highly likely that frames of reference for technologies and costs have changed. Using the most up to date information will increase the credibility and viability of the document.			Open	dm
14	Page 5-4 (Sec. 5.2.1)	Section 5.2.1 sates: "As analyzed in the IDF PA, the inadvertent intruder scenarios evaluate the acute impact via the well driller scenario and the chronic impact via the rural pasture scenario."	Include tribal scenario.	Why is there no tribal scenario?			Open	sd
15	Page 5-8,	Footnote 62 states: "The primary contributors to the peak dose after the 1,000-year compliance period are ^{99}Tc and ^{129}I in the HEPA filters and carbon bed adsorbers, respectively, and not from the VLAW which is addressed by this Draft WIR Evaluation. The IDF PA models include radionuclides from HEPA filters and carbon bed adsorbers, as well as waste from other WTP facilities, and therefore are bounding for the DFLAW approach."	The WIR Evaluation should be updated to include the secondary waste referenced in this footnote before a final WIR Determination is made.	The PA will be used to support decisions related to the WIR determinations.			Open	JY
16	Page 5-9, bottom of page reference 63	Footnote 63 states: "Secondary solid wastes are radioactive solid waste derived from WTP operations and will include a wide variety of wastes from routine maintenance activities, non-routine maintenance activities, and day-to-day operating activities… SSW is not within the scope of this Draft WIR Evaluation and is discussed for completeness and additional information only." There is less uncertainty applied to the parameters that control releases of key radionuclides from secondary solid waste (SSW).	If the WIR Evaluation is not updated to include secondary waste as recommended, explain why USDOE believes the decision to exclude SSW is justified.	A WIR for SSW should reflect information found in the IDF PA.			Open	JY
17	Page 5-9 and others	Secondary waste is mentioned several places, and in some cases well explained. Yet, this WIR does not include secondary waste as a contributor. That seems incomplete.	Add secondary solid waste to the analysis.	Full disclosure of all of the potential waste streams of concern.			Open	dm
18	Page 5-10, bottom paragraph	Another example of the use of "compliance", in this case "…time of compliance…"	Further explain and define all terms so as to aid to the understanding of the reader	Different terms denoting different phases can become confusing.			Open	dm

Review Comment Record	Washington State Department of Ecology Nuclear Waste Program	Date: November 23, 2020 Page 1 of 49

Document Title(s)/Number(s):

Performance Assessment

Document Manager	Telephone Number	Project Manager	Telephone Number	Facility Site ID	Cleanup Site ID
Suzanne Dahl	372-7892	Dan McDonald	372-7988	IDF	

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
1	General	The use of "2017 IDF PA [Integrated Disposal Facility Performance Assessment]" intermittently throughout the document makes the reader think the authors are discussing an older PA. We suggest globally removing 2017 except in the first instance so the PA is always referred to as the IDF PA.					Open	TT
2	General	This report has not been updated with the most recent data (e.g., climate), models (e.g., Central Plateau Groundwater Model [CPGWM] v8.4.5), or reports [e.g., 2019 Groundwater Monitoring Report (DOE/RL-2019-65)]. Update report with the most recent data.					Open	TT
3	General	Numerous figures are copied from other reports and are of poor quality. We suggest obtaining the raw figure files for insertion into this document.					Open	TT
4	General	This report is over 1,800 pages long. Information is repeated multiple times throughout the document. We suggest improving the document's readability and size by removing repetitive text and referencing previous sections.					Open	TT
5	General	**INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL:** The IDF PA Rev 1A document was developed in accordance with DOE Order 435.1 and will be a key supporting document to the Waste-Incidental-to-Reprocessing evaluation that will be publically reviewed. The results are also **intended to support IDF permitting requirements.** Both of these activities require the PA document to be reviewed by the Washington State Department of Ecology and other stakeholders.	Clarify that the IDF PA is a document that supports the IDF RCRA permit. If so, the word "intended" undermines the meaning of requirement. This characterization is also being reflected in the PA document. Also what is meant **by "a key" document? Is there are other key documents? If so, what are they?**				Open	DG
6	General	Section 1.1; L 15-19: "Onsite disposal of radioactive waste could potentially result in long-term radiological exposure to members of the public in the future and should be conducted in a manner that not only protects the public during facility operations, but also ensures that the public will be protected from all residual radioactive material in the future."	This talks about the risks to human health only. What about the ecological impact? Whether it is required or not, it needs to be addressed since it is a big stakeholder's issue.				Open	DG

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
7	General	Section 1.1, L35- 39: "the PA also contains results that can be used to address operating conditions that are specified in the facility's *Resource Conservation and Recovery Act of 1976* (RCRA) permit, WA7 89000 8967, *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion Revision 8C for the Treatment Storage, and Disposal of Dangerous Waste*."	The document does not clearly say that its purpose is to meet a permitting requirement. However, this indicates that it has information that may be used for the permit. One or two sentences should be added to clarify its purpose in relation to the Rev. 8C/9 etc.				Open	DG
8	General	The impact of higher diffusion rate(s) from the cementitious material is not adequately addressed (reference Section 1 and other referenced chapters/sections). Explain why the impact of higher diffusion rate(s) from the cementitious material does not matter. As we know, the diffusion release may affect the infiltration rate eventually and subsequent adsorption and desorption. The diffusion transport out of a contaminant media may also become different once it reaches the media. A sensitivity analysis would be helpful to understand its impact on fate and transport.					Open	DG
9	General	The document needs to include more recent hydraulic data gathered from the large scale pumping tests in the nearby areas (e.g. 200 BP-5 OU) for a better evaluation and reduce the assumed uncertainties on various hydraulic parameter input data on the saturated zone modeling. An option to address this issue is to develop an alternative scenario taking the data from the large scale pumping tests recently conducted in the 200-BP-5 OU showing high hydraulic conductivities and transmissivities, and related parameters and do sensitivity runs to see its impact. Please note that some of the new parameters differ by several order of magnitudes, e.g. the transmissivity, flow velocity, etc.					Open	DG
10	General	Address Uncertainties by supplementing the analysis with more recent data: It seems the data considered for the analysis of fate and transport dates back to 2011 and older. Use of more recent data will reduce uncertainties observed at the IDF on stratigraphic continuity, hydraulic parameters and related calibration. The range of hydraulic parameters considered is not clear (e.g. hydraulic conductivities, transmissivities, Groundwater flow velocities, etc.). Provide a table showing what values are considered and how it differs from the TGD developed for the TC-WM EIS.					Open	DG

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
11	General	Difficulty in interpreting a consistent geological framework: Presence and absence of certain units of the Hanford and Ringgold formation shown in various diagrams in section 3 is confusing. Provide a consistent approach based on the data with references.					Open	DG
12	General	All groundwater and concentration data presented are about 7 years old. Provide the cutoff date of the information considered in this report and explain why the latest information could not be incorporated. Also, compare your data with the TC-WM EIS.	Use more recent groundwater data available in various published documents.				Open	DG
13	General	IDF PA traceability to the TC-WM EIS is not always apparent. Section 2.5.4 addresses some of this.	Include a table that compares base, source term, vadose zone, saturated zone, and their development compared to the TCWM EIS.	Ecology was a cooperating agency on the development of the TC-WM EIS cumulative impact assessment.			Open	JY
14	General	The term liquid secondary waste appears 85 times in the first ~970 pages of the PA, yet secondary waste is not incorporated into the Draft WIR Evaluation. It is obvious that liquid secondary waste is an important contributor to the adequacy and accuracy of the PA.	Better inform the reader of the importance of liquid secondary waste, and consider its inclusion in the WIR Evaluation.				Open	DM
15	General	The term solid secondary waste appears 95 times in the first ~970 pages of the PA, yet secondary waste is not incorporated into the Draft WIR Evaluation. It is obvious that solid secondary waste is an important contributor to the adequacy and accuracy of the PA. Items such as carbon adsorbers and HEPA filters are noted to be large contributors to the solid secondary waste inventory.	Better inform the reader of the importance of solid secondary waste, and consider its inclusion in the WIR Evaluation.				Open	DM
16	General	The term 'risk assessment' appears 29 times in the PA document. On page 2-1, a risk assessment is noted as having been completed in 2003. Also on that page, it is noted that the PA 'may also provide' the risk assessment information needed for the IDF RCRA permit.	It would seem that risk assessment information is critical to the accuracy, adequacy, and consistency of PA information. If so, why is this initiative relying on data that is approaching 18 years old?				Open	DM
17	General	Throughout the document are references to "PA maintenance activities" and associated decisions.	It is obvious that PA maintenance is a significant contributor to the accuracy and adequacy of the documents. The issue here is how DOE will ensure that PA maintenance will be accomplished, given the short time frame approaching DFLAW operations.	The information for IDF must be maintained current as the DFLAW operations horizon is approached. How will DOE ensure that PA information continues to be timely?			Open	DM
18	General	Throughout the document are references to "…it is believed…"; "…[we] believe…" These assertions do not seem to be supported by calculations or foundational documents. Examples: pages 93/1828, 93/1828, 99/1828. 165/1828, 506/1828, 529/1828, 886/1828, 1429/1828, 1600/1828, 1627/1828.	There is no context for the reader to also "believe" the assertions made. There needs to be appropriate justification/foundational reasoning for the assertions made.	At present, the information is not supported. The reader is expected to also "believe" that what is said is rational and reasonable.			Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
19	General	Continuing through the document are many, many references to uncertainties. So many that the reader is left wondering what foundational basis of certainty is manifest in the PA. Some of the noted uncertainties seem to be fairly seminal in nature. Examples include page 3-270, 3-271, 4-45, and following…	What decision processes (consistent and conservative) were used to ensure that these uncertainties do not become cumulative, and do not cause the calculational information to become quickly "out of bounds" for acceptance?				Open	DM
20	General	More examples: 4-119, 4-127	In the case of 4-127, that seems to go against previous commentary on cementious waste form studies being available for reference. It would seem that the issues noted on page 4-127, lines 10-12 would have been dealt with in previous studies. If those issues have not been dealt with using Hanford-type waste, then the statements that previously studied cementious waste forms are representative may not be valid.				Open	DM
21	General	Uncertainty seems to prevail in this PA. From materials, to inventories, to chemical and physical properties, to process expectations – there is so much uncertainty woven through this document that it is difficult to understand just how 'certain' the outcomes and outputs from this PA will be.					Open	DM
22	General	This PA seems to rely on forthcoming PA maintenance activities to ensure information is kept up to date. The anticipated date for LAW hot commissioning to be complete is December 2023 (Consent Decree). Time will pass quickly and there seems to be much PA maintenance that is required to be ready by then. If hot commissioning is completed before December 2023, then associated PA maintenance will have to have been completed, as well.	Provide a priority schedule for PA maintenance activities, to ensure that the PA requirements will not delay hot commissioning and operations of DFLAW.				Open	DM
23	Section 1.5.1; Page 1-15	Key finding 2: Sensitivity analysis period peak dose It is not clear why the peak dose between the two analyses (without the uncertainties and with uncertainties) varies by only 0.2 mrem/year in spite of quite a few uncertainties.	Make necessary changes in appropriate section(s).				Open	DG
24	Chapter 1, Section 1.5.3, Page 1-20, Line 18	The bullet list presents options for mitigating potential technetium-99 (Tc-99) concentrations that are above the performance standard. The third bullet states: "an alternate disposal approach for the [high-efficiency particulate air] HEPA waste filter stream, **or…**." There is no fourth bullet, nor any text explaining this fourth option.	Provide a complete list of mitigation options or delete the "or" at the end of the third bullet.				Open	TT
25	Chapter 1, 1-20, 2.5.3, Sent. 16	Describe in more detail the 2nd bullet on more rigorous modeling.					Open	JY

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
26	Chapter 1, Section 1.5.5, Page 1-22, Line 25	Correct the misspelling of "dose."					Open	TT
27	Chapter 1, 1-23, 1.5.5, Sent. 3	What is the importance of this information that it can wait to be included in the maintenance document?					Open	JY
28	Chapter 1, 1-24, Sent. 23-33,	Should the impact of co-disposal scenarios of cement based and vitrified waste forms be investigated as related to table 1-3?		Table 1-3. Source Term-Cementitious Waste Form – chemical- states that this could be significant in meeting performance objectives.			Open	JY
29	Chapter 1, Section 1.5.6, Page 1-25, Bullet 3	The third bullet indicates the most significant waste form is generally the solid secondary waste (SSW). This is attributed to high concentrations of Tc-99 and iodine-129 (I-129) in the SSW coupled with higher diffusion rates from cementitious waste than from vitrified waste. The following sentence states: "this general observation does not apply if one assumes a pessimistic glass alteration rate and an optimistic diffusive release rate from SSW grouts." It is not clear whether these "pessimistic" and "optimistic" rates have any basis in expected material properties or release dynamics. Provide context or references for pessimistic and optimistic rates.					Open	TT
30	Chapter 1, Section 1.5.6, Page 1-25, Line 45	Replace first instance of "are" with "at."					Open	TT
31	Page 1-25, lines 17-20	This commentary indicates that the most significant waste form is generally SSW due to its high concentration of ^{99}Tc and ^{129}I in the waste.	Given the significance of this commentary, it seems unreasonable that secondary waste is not well considered in the PA/WIR set of documents.				Open	DM
32	Section 1.6.2; Page 1-37	Key observation #2, and related studies Highlight the differences between the process model vs system model and observation from the deterministic vs probabilistic assessment. It is not clear why the base scenario is mentioned but not the other assessments done through different sensitivity and uncertainty analysis.	Make necessary changes in appropriate section(s).				Open	DG

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
33	Section 1.6.2; P-1-42	The text says that the magnitude of impact is directly correlated to dispersive mixing and dilution of contaminants in the groundwater flow of the saturated zone, which reduces contaminant concentrations at the 100-m buffer zone boundary. It is not clear if the same phenomenon will be observed for 1000 or 10000 years. If so under what assumptions. Did it include the assumptions identified in table 1-5? In addition, it is not clear if the gravel correction for Kd was applied under different scenarios.					Open	DG
34	Section 1.6.4.2; P-1-45	Key observation # 7 The recharge value 3.5 mm/yr is not to be defined/highlighted as "pessimistic". It is actually based on a broader evaluation to protect the human health and the environment under a variety of scenarios.	Make necessary changes in appropriate section(s).				Open	DG
35	Section 1.6.5.4; Page 1-59	Key finding # 6 Sensitivity analyses provide a range of groundwater peak dose values between 0.8 and 5.8 mrem/yr, excluding unlikely hypothetical inventory cases meant to explore potential constraints on disposal limits. Did you do any calculation/evaluation of what would be the starting point that one should be careful to not exceed such limit so as not to cause any potential constraints on the inventory? Explain in context with the risk budget tool. It was stated in the key finding #8 (page 1-66) that alternative inventories and inventory allocation scenarios have been evaluated using different scenarios (diffusivity, mobility, etc.) in the sensitivity analyses showing peak doses above 200 mrem/yr for Case 10A and above 100 mrem/yr for Case 10B. Although these alternative inventory scenarios are hypothetical and do not reflect expected operating conditions, more rigorous modeling of the reduction and oxidation (redox) conditions in the cementitious waste form is necessary to evaluate the suitability of cementitious waste forms that contain high concentrations of redox-sensitive COPCs, such as 99Tc.	Provide a path forward to address these issues. Make necessary changes in appropriate section(s).				Open	DG
36	Section 1.6.5.4; page 1-60, Figure 1-16	It is not clear why almost 90% 300 realizations of the total dose is close to less than one order of magnitude difference from the very beginning to about 7000 years in spite of the observation that the changes of peak concentration were found due to dispersion and dilution. From the figure, it seems there will be no changes of leak concentration over a long period of time (say up to 7000 years) in spite of dilution and dispersion.	Clarify your observation in context with the comment. Make necessary changes in appropriate section(s).				Open	DG

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
37	Chapter 1, Section 1.6.5.5, Page 1-70, Lines 4 through 11	The text lists three uncertain characteristics of the saturated zone materials that determine the saturated zone flow field. In short, they are (1) representativeness of model-calibrated properties of the Hanford formation, (2) representativeness of Hanford-Ringold contact, and (3) characteristics of the Ringold Unit E. The text also states, "these properties can be characterized by large-scale pumping tests conducted from properly-designed and installed wells in the saturated Hanford formation near the disposal facility." Because the PA did not adequately characterize or manage these uncertainties, we recommend conducting pumping tests. The southeast corner of the facility may be an optimal location for such a test. If a test were conducted in a well screened within Ringold Unit E, it would not encounter the difficulties that complicate testing the Hanford formation (where the hydraulic conductivity is believed to be so high that it is difficult to observe drawdown). Such a test could at a minimum reduce uncertainty regarding the properties of the Ringold Unit E and the location and significance of the contact between the Hanford and Ringold formations.					Open	TT
38	Page 2-12	On this page it says …"related IDF assessment activities (e.g., safety assessments, risk assessments…) are evaluated in other documents."	What other documents are referred to concerning risk assessments? Are they more current than the 2003 document? If so, why are they not predominant in this PA?				Open	DM
39	Page 2-38	What are the dates of the two risk assessments that are referenced here?	Though the dates are referenced later in a table on page 2-41, please provide the date of issuance of both documents here.				Open	DM
40	Chapter 2, Page 2-58, Sent. 37-40	Is the conclusion that this work can be used as a permit condition for future tracking of performance in the Risk Budget Tool? Is this a description of the Risk Budget Tool?					Open	JY
41	Page 2-64, lines 15-17	The comment says "…STOMP software is not capable of varying the dispersivity as a function of distance from the source…"	Please explain how not evaluating this contributor either does or does not pose a concern to the outputs of the model and its use in decision-making in the PA.				Open	DM
42	Page 2-106, "Saturated Zone – Hanford formation"	The comment says that "uncertainty …has not been quantified." Given that hydraulic conductivity affects dispersive dilution, what frame of reference or boundary has been applied to know the adequacy of the calibration?	Provide mechanisms to better quantify and (prove accurate) the hydraulic conductivity calibrations.				Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
43	Page 2-107, lines 22-29.	There are six significant uncertainties listed here. There is no information presented to ensure that the initial PA is "on target". In addition, the following comment says that they can be addressed by focused PA maintenance activities.	Explain the priorities of the uncertainties, whether they are interrelated and how, and provide a schedule for addressing through a focused PA maintenance activity these issues (which need to be in place and ready potentially by the cold commissioning phase of DFLAW readiness.)				Open	DM
44	Chapter 3, Section 3.1.2.2, Page 3-19, Table 3-1	The temperature averages in Table 3-1 end with 2013. Provide complete temperature averages (monthly and annual) for 2013 through present or explain why they are not available. If these averages are available, also revise the text on page 3-18 that refers to Table 3-1.					Open	TT
45	Chapter 3, Section 3.1.2.3, Page 3-21, Table 3-2	Same as previous comment, but for precipitation averages from 2013 to 2018.					Open	TT
46	Chapter 3, Section 3.1.4.3.2, General Comment	The text on Page 3-74, Paragraph 2, states "the upper contact of the [Ringold] Unit E is not easily identified at the IDF site. In the western part of the study area, unconsolidated gravels of the Hanford formation directly overlay the Ringold Unit E gravels, making exact placement of the contact difficult." The two units are difficult to distinguish from each other, but their hydraulic conductivity values vary by more than three orders of magnitude in the CPGWM (according to page 3-98, lines 25 through 28). The identification of which unit is present at the water table may be the most consequential component of this modeling effort and potentially, the most important input to the PA. Provide a discussion of the criteria used to distinguish between Hanford gravels and Ringold Unit E gravels.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
47	Chapter 3, Section 3.1.4.3.2, Pages 3-80 through 3-82, Figures 3-38 through 3-40	There are numerous problems with the cross-section map and the sections themselves. Specifically: a. The lack of color in Figure 3-38 makes it difficult to distinguish A-A' and B-B'. b. The cross-sections (Figures 3-39 and 3-40) do not match what is presented on the cross-section map (Figure 3-38). For instance, cross-section line A-A' (Figure 3-40) intersects borehole E-24-18 on the map but this boring is not included with the cross-section. c. Paleomagnetism logs are included on cross-section A-A', but they are not identified by borehole name. Interpretation of these logs is not discussed in the text. d. Cross-section B-B' is shown on the map but is not provided. e. Cross-section C-C' (Figure 3-39) includes horizons/contacts (L_1, L_2, L_3) that are not explained. f. The Hanford Units (G_1, S_1, etc.) are not explained on the figures or in the text, and not integrated into the discussion of site hydrostratigraphy. g. The contact between the Hanford and Ringold formations is presented as a solid line, which does not accurately reflect the uncertainty in the contact suggested by the "Ringold?" at the bottom of the gross gamma log associated with borehole E24-7 on cross-section C-C'. Clarify the A-A' and B-B' transects on Figure 3-38; ensure all borings are included on the A-A' cross-section; explain the location and interpretation of the paleomagnetism logs in the text; include a cross-section figure for B-B'; and explain and identify all horizons and contacts on the C-C' cross-section.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
48	Chapter 3, Section 3.1.4.3.2, Pages 3-81 and 3-82, Figures 3-39 and 3-40, Cross-Sections C-C' and A-A'	The position of the water table is indicated at many of the boreholes on both figures. They are un-dated on Figure 3-39 (Cross-section C-C') and given dates ranging from 1998 to 2002 on Figure 3-40 (Cross-section A-A'). The water table appears to have an elevation of approximately 135 meters on cross-section C-C' and an elevation of between 140 and 150 meters on cross-section A-A'. The range of water table elevations listed in Table 3-3 is 120.7 to 123.4 meters, for measurements conducted from 1996 to 2004 (excluding an apparent outlier measurement of 103.6 meters at E17-17 in October 1998). Update the water table elevation data on the cross-sections to be consistent with the more recent elevations on Table 3-3.					Open	TT
49	Chapter 3, Section 3.1.4.3.3, Page 3-88, 5th Bullet	This bullet says, "due to the significance of the contact of the Ringold Unit E and the water table, it is relevant to define the density of the geologic information used to control the definition of this contact. The well control used for the top of the Ringold Unit E is illustrated in Figure 3-53." Update section 3.1.4.3.3 to include a detailed discussion of the criteria applied to distinguish the Ringold Unit E gravels from the Hanford H3 gravels (see Chapter 3, Comment 3, above).					Open	TT
50	Chapter 3, Section 3.1.4.3.3, Pages 3-90, 3-91, and 3-93, Figures 3-46, 3-47 and 3-49	All three of these figures portray the Ringold Unit E subcropping below the Hanford H3 gravel beneath the southeastern and central portions of the IDF. The previous set of cross-sections (Figures 3-39 and 3-40) show the Ringold Unit E has been removed through erosion (scouring) throughout the central and southeastern portions of the IDF area. In addition, depiction of the Ringold Unit E on Figure 3-49 is different from that presented on Figures 3-62 and 3-63 for IDF geologic framework model. Provide a consistent interpretation of site geology throughout this section, including both text and figures.					Open	TT
51	Chapter 3, Section 3.1.4.3.3, Page 3-91, Figure 3-47, Cross-section B-B'	This cross-section shows the Ringold Unit E gravel pinching out at the western edge of the IDF excavation area. However, Table 3-3 indicates that the Ringold Unit E was encountered in all six boreholes west of the IDF excavation (E17-21, E18-1, E18-3, E18-4, E19-1 and E23-2). Resolve conflicts between Figure 3-47 and Table 3-3 so that this section presents a consistent interpretation of the extent of Ringold Unit E in both text and figures.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
52	Chapter 3, Section 3.1.4.3.3, Pages 3-92 and 3-93, Figures 3-48 and 3-49	Both figures have an irregularly shaped region in the north-central portion of the H3 upper surface, shaded orange on Figure 3-48 and red on Figure 3-49. An explanation of this area is not provided in the figure legends. Update both figures to explain this feature.					Open	TT
53	Chapter 3, Section 3.1.4.3.4, Pages 3-98 through 3-109, General Comment	The text refers to an older version of the CPGWM throughout this section. As a result, the discussion implies a major difference between the Hanford South Geoframework Model (upon which the IDF PA is based) and the CPGWM, in terms of in the location of the contact between the Hanford H3 gravel and the Ringold Unit E gravel. The location of this contact has major implications in the interpretation of groundwater flow beneath the IDF. The text refers to Version 6.3.3 of the CPGWM, released in July 2015, rather than Version 8.3.3, released in January 2018. The location of the contact in Version 8.3.3 is consistent with the Hanford South Geoframework model, and thus the IDF PA. Although there is some value in comparing the geoframework used in CPGWM version 6.3.3. to the Hanford South Geoframework Model (to highlight the significant uncertainty in the mapping of the Ringold Unit E contact), referencing the old version rather than the new version introduces unnecessary confusion into the discussion of the CPGWM and the IDF models. Update the entire section to reflect the changes in the CPGWM with its update to version 8.4.5 in December 2017.					Open	TT
54	Page 3-98, lines 29-33	What potential impact (if any) is likely given the differences in grid cells, and the associated impact? Has the potential for impacts not yet evaluated been at least been considered?	Please bound and explain any potential impacts and how those impacts will be mitigated or eliminated.				Open	DM
55	Chapter 3, Section 3.1.4.3.4, Page 3-104, Figure 3-58	Figure 3-58 shows the distribution of hydrostratigraphic units (HSU) at the water table used in the Tank Closure and Waste Management (TC&WM) environmental impact statement (EIS) framework model. The location of the IDF is not shown on this figure. Show the outline of the 200 West and East Areas so the IDF area can be approximately located with respect to the "highly-conductive Hanford formation" property zone.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
56	Chapter 3, Section 3.1.5.3.2, Page 3-144, Lines 2 through 7	The first paragraph states that no measurements of moisture content were taken from the IDF area, but that moisture content is similar in the area of Waste Management Area (WMA) C, where measurements were taken. However, this paragraph further states that there is less gravel content in H2 at IDF. No explanation is given for how this determination was made or the effect that the presence of less gravel would have on the moisture content at the IDF. Provide more information about the relative amount of gravel at the IDF relative to WMA C and how that would impact moisture content.					Open	TT
57	Chapter 3, Section 3.1.5.4, General Comment	All groundwater and concentration data presented are at least 5 years old (2015 and earlier). The potentiometric maps cover a large portion of the 200 East area, and the IDF area is presented at a small scale, rendering features important to this PA difficult to discern. For instance, the base case modeling results in Section 5.2.2 indicate a localized northeast-directed flow direction, which is not apparent on any of the potentiometric maps in Section 3.1.5.4 (Figures 3-89 through 3-91). The model results would be better supported by the conceptual model if the observed potentiometric contours were aligned with the flow vectors presented in Section 5.2.2. Furthermore, the contours provided on Figures 3-89 through 3-91 support a horizontal hydraulic gradient value in the 6E-6 to 9E-6 range, rather than the value of 2E-5 that is cited throughout the PA. Update the maps to include more recent data. Re-create the potentiometric maps of the IDF area at a scale that is more legible, supports the conceptual model, and permits a comparison with numerical model results.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
58	Chapter 3, Section 3.1.5.4.2, General Comment	Much of the section is devoted to an in-depth analysis of water table maps and hydraulic gradient calculations (four pages), while the development of hydraulic property estimates is barely discussed (two paragraphs). An estimated range of 10 to 7,000 meters per day (m/d) for the Hanford formation hydraulic conductivity is presented in this section; however, the IDF PA subsequently defaults to a value that exceeds this range by more than a factor of two (17,000 m/d) for the remainder of the document. There is no discussion of the basis for the 10 to 7,000 m/d range in this section, and no discussion why that range of values is discarded in favor of the estimate of 17,000 m/d, which is commonly used for the H3 Gravel throughout the remainder of the document. Update this section to provide an explanation of the range of appropriate hydraulic conductivity values or revise the document to use a consistent hydraulic conductivity value.					Open	TT
59	Chapter 3, Section 3.1.5.4.2, Pages 3-166 through 3-168, Figures 3-89 through 3-91	The text on page 3-152, Lines 8 to 10, states that measurements with high residuals were systematically removed from the analysis of groundwater flow direction and hydraulic gradient. It is unclear whether all of the wells with posted water level elevations on Figures 3-89 through 3-91 are used in the contouring. Update Figures 3-89 through 3-91 to graphically distinguish wells not used in the contouring on these figures. It would also be helpful if the wells that are part of the low hydraulic gradient network would be distinguished with a different symbol. Wells 299-E18-1 and 299-E17-26 are not included in Figures 3-89 through 3-91, even though they are listed as part of the IDF monitoring well network on Table 3-9, which indicates they were being measured in 2015 (Figure 3-91). Update the figures to include these wells or provide an explanation of why they are not included.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
60	Chapter 3, Section 3.1.5.4.3, Page 3-171, Lines 20 to 22	This paragraph cites a groundwater flow velocity of 0.002 to 0.003 m/d that is based on a hydraulic conductivity range of 68 to 75 m/d, developed from slug testing. While these estimates are nominally within the 10 to 7,000 m/d range of hydraulic conductivity cited for the Hanford formation in Section 3.4.1.4.2, they are three orders of magnitude lower than the 17,000 m/d value commonly used throughout the document. The velocity estimate is also not consistent with the most recent published groundwater flow rates for the Hanford formation below the IDF of 2.8 m/d and 0.48 m/d (DOE/RL-2018-65 and DOW/RL-2019-65). Groundwater flow velocity calculations should be based on hydraulic parameter estimates that are consistent with hydraulic parameters used in the IDF performance evaluation and those provided in recent documents. Update this section with groundwater flow velocity estimates consistent with recent published values and based on a hydraulic conductivity value, or range of values, that is consistent with the IDF performance evaluation.					Open	TT
61	Chapter 3, Section 3.1.5.4.3, Pages 3-171 to 3-172, Tritium	It is suggested that both figures referenced in the section (Figures 3-92 and 3-95) show the tritium plume from its source in the 200-PO area to the Columbia River. However, neither actually shows the Columbia River, thus they do not show the whole tritium plume. Figure 3-92, titled "Central Plateau Groundwater Contaminant Plumes in 2015 and Remediation" is primarily focused on the 200 West area (for instance, all of the "remediation" depicted is in the 200 West area). The tritium plume shown on Figure 3-92 (and the subsequent figure 3-93) are largely overprinted with the other plumes, thus, they are not useful in illustrating the extents of the tritium plume. Provide a figure that depicts the entire tritium plume to accompany this discussion.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
62	Chapter 3, Section 3.1.5.4.3, Page 3-177, Table 3-9	The base case saturated zone flow model analysis in Section 5.2.2 suggests a preferred flow/transport direction from the center of the IDF toward the northeast corner of the facility. Well 299-E24-18 is at the predicted closest downgradient location, thus, it should be included in the IDF monitoring well network. Update Table 3-9 to include this well as part of the IDF monitoring network and update any text that refers to the wells in this network. Although this table includes information about depth to water, it does not include the groundwater elevation, which is necessary to compare water levels between wells. Update the table to include a column for top of casing elevation and/or groundwater elevation.					Open	TT
63	Chapter 3, Section 3.1.5.4.4, Page 3-183, General Comment	This section titled "Groundwater Travel Times" provides a range of groundwater travel times that were estimated from an unspecified location in the 200 East area to the Columbia River. The travel time appears to be estimated from a historic analysis of the tritium plume. However, the section does not discuss local-scale contaminant transport in the context of the 200 East area. Nor does the discussion provide the distance over which the travel time estimate was made nor the underlying parameter estimates (i.e., hydraulic conductivity [K], gradient [I], and effective porosity [n_e]). Provide a more thorough discussion of travel time in the 200 East area and how groundwater travel times in the IDF area are expected to compare to the larger 200 East area. For example, the recent calculation package, "Hydraulic Gradients and Velocity Calculations for RCRA Sites in 2018" (ECF-HANFORD-18-0049, Rev 0) provides a comprehensive table (Table 1) of estimated flow rates across the Hanford Site, with the underlying parameter values clearly specified. This table, as well as the 2018 and 2019 RCRA Monitoring Reports (DOE/RL-2018-65 and DOE/RL-2019-65), provide adequate data support for the estimated flow rates. Table 1 of ECF-HANFORD-18-0049 lists a number of estimates calculated from the assumed K (17,000 m/d) for the paleochannel in the Hanford formation. These estimated groundwater flow rates range from 0.38 to 2.8 m/day. The highest value (2.8 m/d) is calculated for the IDF area.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
64	Chapter 3, Section 3.1.6.1, Page 3-187, Table 3-11	The table only provides distribution coefficient (K_d) estimates for the H2 sand from the WMA C PA. It is unclear which formation's K_d estimates are presented from the TC & WM EIS. The text states (on page 3-184, lines 26 to 28) that Table 3-11 is provided so that the K_d values on Table 3-10 can be compared with K_d values from previous evaluations. Because Table 3-10 includes K_d estimates for both the H2 sand and H3 gravel, values for both units should appear on Table 3-11. Update Table 3-11 to clarify which formations K_d values are presented and include K_d values for the H3 sequence.					Open	TT
65	Page 3-226, lines 35-39	There are three uncertainties noted, and the comment that they are nested. What does that mean in terms of cumulative uncertainties surrounding the BBI inventory numbers?	Please explain the relationships of the uncertainties and the rationale for bounding the estimates within the PA usage of the BBI.				Open	DM
66	Chapter 3, Section 3.3.2.4, Page 3-233, Figure 3-116	Supplemental Low-Activity Waste (SLAW) is shown to produce a waste stream at the IDF from the Hanford Tank Waste Operations Simulator (HTWOS) analysis. SLAW is not mentioned anywhere else in this document. Update the text to state that SLAW was not simulated in the base case or sensitivity cases provided in the IDF PA or refer the reader to recent reports on SLAW, such as PNNL-28992.					Open	TT
67	Chapter 3, Section 3.3.3, Page 3-238, Figure 3-117	Silver mordenite (AgM) is mentioned several times throughout Section 3.3.3 as an important contributor of I-129 and that it contains proportionally higher radionuclide inventories. However, this waste stream is not depicted on the figure. Update figure 3-117 to show AgM.					Open	TT
68	Page 3-242, lines 27-30	There is no information to show that "available information" is representative of what will be needed for Hanford wastes. In searching the literature, there has not been found "like waste" performance studies of cementious grout that could potentially be used at Hanford and meet all acceptance criteria.	If there are studies that have used Hanford waste constituents in testing, please provide that information for review.				Open	DM
69	Page 4-3, section 4.1.4.1	Use of terms in this section and in others seems to be confusing. Post-closure compliance period, compliance vs post closure, compliance and post-compliance, and so on	Perhaps a look at consistency for terms, including definitions to aid the reader in understanding	Different terms denoting different phases can become confusing.			Open	DM
70	Chapter 4, Section 4.2, Page 4-6, Line 15	The PA states that groundwater predominantly flows to the east. However, groundwater flow direction depends on the gauging event considered in this sentence. At the IDF, groundwater flow direction can be from northeast, east, and southeast. Provide a timeframe that applies to this statement.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
71	Chapter 4, Section 4.2.1.1, Page 4-9, Lines 12 and 13	The PA states that surface flow recharges the vadose zone around the edge of the surface barrier. We recommend installation of lysimeters where re-directed precipitation will infiltrate into the vadose zones, at the edges of the proposed cap. This will improve characterization of hydraulic properties of the vadose zone and prediction of the rate at which radionuclide concentrations are likely to migrate to the saturated zone.					Open	TT
72	Chapter 4, Section 4.2.1.1, Page 4-9, Lines 43 and 44	Suggest adding Layer 7 (asphalt) to this bullet because it also serves as a low-permeability barrier layer and a human / bio-intrusion barrier, as depicted on Figure 4-6.					Open	TT
73	Chapter 4, Section 4.2.1.1, Page 4-12, Figure 4-5	A higher flux (i.e., net infiltration rate) into the vadose zone may be expected where the re-directed precipitation infiltrates, as denoted under Barrier Runoff (see last bullet on pages 4-29 and 4-30). We suggest making these arrows slightly larger to convey a slightly higher flux into the vadose zone.					Open	TT
74	Chapter 4, Page 4-14, 4.2.1.2, Sent. 36-40	Since the water composition decision basis was expert judgment and changes in chemistry not accounted for, how is this defensible enough to use for a WIR determination or a regulatory decision?					Open	JY
75	Chapter 4, Section 4.2.1.2.4, Page 4-23, Equation 4-5	Correct the mistaken definition for specific discharge, which should be represented by "v" not "c_j" on Line 12.					Open	TT
76	Chapter 4, Section 4.2.1.2.4, Page 4-23, Line 18	Correct the mistaken definition for *total volume of the waste form(s) over all the i-th cells*, which should be represented by "V" not "θ_T" in Equation 4-6.					Open	TT
77	Chapter 4, Page 4-25, Sent. 25-26	This relates back to comment 3. Co- disposal is important in that it can affect degradation transport in different ways. This sentence says the process modeling has been neglected. Explain.					Open	JY
78	Chapter 4, Section 4.2.2.1, Page 4-27, Lines 34-37	Identifying the hydrogeologic unit at the water table is very important to fate and transport of radionuclides in the saturated zone (see Section 5.2.3). Where the water table changes from H3 to Ringold Unit E is uncertain due to a lack of borehole data beneath the IDF footprint (see Figure 3-52). We recommend additional drilling of monitoring wells to reduce uncertainty as to where the Ringold Unit E thins out. This recommendation of drilling wells near the IDF appears also in the latest version of the CPGWM report on page 8-4 (CP-47631, Rev. 4).					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
79	Chapter 4, Section 4.2.2.2, Page 4-34, Lines 25-27	The PA references an outdated version of the CPGWM model. Revise to refer to CPGWM model version 8.4.5 (CP-47631, Rev. 4), which we believe to be the current version.					Open	TT
80	Chapter 4, Section 4.2.3, Page 4-39, Lines 26-34	The PA proposes an alternative approach to calculate downwind concentrations at IDF than was used for the Environmental Restoration Disposal Facility (ERDF) PA and the WMA C PA. However, it does not confirm that this approach will be more conservative or more accurate. WMA C is not that far away from the IDF and average wind speed data and dispersivity values likely are similar at these locations. Provide a justification for using the alternative approach.					Open	TT
81	Page 4-40	The Central Plateau Ecological Risk Assessment Data Package Report is 13 years old.	Is there no other more recent risk assessment information from which to draw?				Open	DM
82	Chapter 4, Page 4-56, Table 4-3	Impact of uncertainty states that the release rates will average out. Explain what this means. (Average out above regulatory standard impacts?)					Open	JY
83	Chapter 4, Section 4.4.1.3.1, Page 4-94, Table 4-10	The total "volume of waste and backfill" is 29,690 m^3. Table 4-9 on the previous page lists 30,000 m^3. Revise Tables 4-9 and 4-10 for consistency.					Open	TT
84	Chapter 4, Section 4.4.1.3.4, Pages 4-102 through 4-104	The discussion of the various forms of diffusivity (molecular, effective, apparent, intrinsic) is difficult to understand. The parameters involved are defined in various ways from equation to equation. For example, the "free-water distribution coefficient" is symbolized as $D_{l^e}^{s}$ in Equation 4.4.1.3-8, and as D_m in Equations 4.4.1.3-12 and 4.4.1.3-13. The terms "diffusive" and "total" porosity are both used; however, no equation relates the one to the other, and the term "porosity" is used in other equations without identifying whether it refers to "total" or "diffusive." After considerable effort, the reader may finally understand that the "effective" diffusion coefficient is used in Surface Transport Over Multiple Phases model (STOMP) to represent diffusion through SSW, and "apparent" is used to represent diffusion through liquid secondary waste (LSW). Revise section to highlight this distinction at the beginning of this discussion so that the reader can better understand what is actually input to STOMP.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
85	Chapter 4, Section 4.4.1.3.4, Page 4-107, Table 4-13	Under the *All* column, the Counts do not add up for any of the parameters in this table. Correct the calculation to reflect the parameters in the table or provide an additional column for any other SSW formulation used to calculate the total.					Open	TT
86	Chapter 4, Section 4.4.1.3.5, Page 4-121, Figure 4-35	The figure showing the geometry and discretization of the B-25 encapsulated waste form does not explain what the cells that are colorless (i.e., white) represent. These cells separate the waste from the steel container. The discussion in Section 4.4.1.3.5 implies that it may be grout, but grout is not identified in the legend of the figure. Update the figure legend to explain what the colorless model cells represent.					Open	TT
87	Chapter 4, Section 4.4.1.3.5, Figures 4-38 through 4-41	These four figures depict the numerical grid used for modeling release from individual and stacked 55-gallon drums. A gradient of color values appears from the center of the drum to its steel shell, but no legend is provided on Figures 4-38 through 4-40. Labels in the legend on Figure 4-41 are STEEL, BACKF (presumably backfill), and W1 through W15. The W labels are not explained, either on the figures or in the text of section 4.4.1.3.5. In addition, no axes titles and units appear on these figures. Update these figures to explain the legend labels/value.					Open	TT
88	Chapter 4, Section 4.4.2.1.5, Page 4-156, lines 16 through 36	This paragraph discusses the parameter upscaling process used in the WMA-C PA, that was carried forward to the IDF PA. The paragraph states that an unexpected result of the process was that the K_{sat} of sand-dominated H2 exceeded the K_{sat} of gravel-dominated H3, but it is not an issue because these K_{sat} values are higher than the infiltration rate. Even though that statement is valid, the WMA-C PA came up with K_{sat} values at the 50th percentile, an order of magnitude lower for H3 than H2 (Table 4-23). The stochastic model used in the upscaling process needs to be re-examined further for both WMA C and IDF to determine why the H3 K_{sat} values are lower than the H2 K_{sat} values.					Open	TT
89	Chapter 4, Section 4.4.2.1.5, Page 4-159, Table 4-24	The parameters N^e and L^e are not defined in the table or as a footnote, and it is possible that N^e should be n^e instead (the van Genuchten fitting parameter). Define all parameters used in the table.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
90	Section: 4.4.2.1.6: P4-160 and Section 3.1.4.3.2	For the gravel-dominated Hanford H3 unit, the uncertainty ranges were obtained from the WMA C PA (RPP-ENV-58782) based on similar analysis on the soil-moisture dataset from representative samples collected from the 200 Area. A total of 17 sample measurements were used to represent the H3 gravelly unit, and the fitted van Genuchten-Mualem parameters are reproduced in Table 4-26 and displayed in Figure 4-57 and Figure 4-58. It is not clear if the regional correction factor used in other sites for the gravel matched with the Kds assumed for different COCs since there are not enough data.	Provide a table showing contaminated specific Kds after and before gravel correction. Please note the amount of gravelly stratigraphy encountered in different borehole as depicted in table 3-4. Page 3-83.				Open	DG
91	Page 4-161, lines 17-20	The readers of this document may not be familiar with the WMA-C PA, nor wish to have to search another document.	Provide appropriate and complete information in this PA so this subject stands on its own.				Open	DM
92	Chapter 4, Section 4.4.2.1.6, Page 4-174, Figures 4-67 through 4-70	Model simulation *Vzp00* is not defined in the text until Chapter 5. Define *Vzp00* as the base case simulation in the text before these figures are presented.					Open	TT
93	Chapter 4, Section 4.4.2.2.2, Page 4-200, General	This entire section (text, tables, and figures) contains references to an outdated version of the CPGWM model. Revise the section to refer to the latest version (8.4.5) of the CPGWM (CP-47631, Rev. 4) and current groundwater monitoring results. a. For example, the calibrated horizontal hydraulic conductivity value of the Hanford formation is currently 15,000 m/d, not 17,000 m/d as in previous model versions. b. Also, the groundwater flow direction at the IDF based on the 2018 groundwater monitoring report (DOE/RL-2018-65, Rev 0) is 79° or east-northeast, not southeast. The 2019 groundwater monitoring report (DOE/RL-2019-65) reports a groundwater flow direction of "slightly south of east." c. Finally, the gradient of observation well triplet 14 is higher (see Figure 4-77 in CP-47631, Rev. 4) in v8.4.5 of CPGWM than the reported values in the IDF PA (Figure 4-89) using CPGWM v6.3.3, Rev 2.					Open	TT
94	Chapter 4, Section 4.4.2.2.2, Page 4-213, Figure 4-87	The hydrographs are not readable even when the reader zooms in. Re-size the figures to improve legibility.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
95	Chapter 4, Section 4.4.2.2.2, Page 4-220, Figure 4-94	Hydraulic conductivity values estimated from slug tests conducted in the Hanford formation near the IDF are less than 100 m/day. Slug tests conducted throughout the Hanford site, however, were near or above 1,000 m/d. Explain in the text on page 4-203 why five wells at the IDF yielded slug test hydraulic conductivity values an order of magnitude lower than at any other well slug tested in the Hanford Formation on Figure 4-94.					Open	TT
96	Chapter 4, Section 4.4.2.2.2, Page 4-220, Figure 4-94	Add the calibrated horizontal hydraulic conductivity of the Hanford formation obtained from version 8.4.3 of the CPGWM to this figure.					Open	TT
97	Chapter 4, Section 4.4.3.4, Page 4-232, Lines 21 through 23	Wind data were tabulated from 1983 to 2006. Provide complete data for 2007 through present or explain why they are not available. Recalculate values in Tables 4-37 and 4-38 if they are available.					Open	TT
98	Page 4-242	Line 21 – "…for consistency with other Hanford performance and risk assessments…"	What other assessments were considered; how was consistency achieved?				Open	DM
99	Chapter 4, Section 4.5.1.4.3, Page 4-257, Equation 4.5-10	The parameter d_f is not defined. Define all parameters for this equation.					Open	TT
100	Page 4-265, lines 26-29	It seems inappropriate to not use calculated increases simply because of uncertainties.	Why were uncertainties not tested, bounded, and calculated for use in this PA?				Open	DM
101	Page 5-1	There is seemingly no relevant information in determining whether the abstractions to system model were appropriate and adequate.	What methodology was used to create the abstractions? What QA was done to ensure that the abstractions were appropriately bounded, and did not very in their conservatisms and non-conservatisms?	It is unclear whether these abstractions are sufficient and adequate to appropriately represent that found in the process-level analyses.			Open	DM
102	Page 5-3, lines 30-37	This section continues the idea of 2-D abstractions. In addition, however, this section speaks to "some simplifications", yet those simplifications are not well characterized.	Explain those simplifications, as they relate to abstractions and the viability of the date subsequent to those simplifications.	It is disconcerting that now, in addition to abstractions, there are 'simplifications' to date.			Open	DM
103	Chapter 5, Section 5.1.1.5, Page 5-36, Figure 5-23	It is challenging to read the graphs when this page is printed. Rotate this figure and re-size to make the graphs larger.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
104	Chapter 5, Section 5.1.2, Page 5-41, Line 33 (Perspective box)	This box cites a fractional release rate for the immobilized low-activity waste (ILAW) glass dissolution model of 2.5E-07 yr^{-1}. Page 5-41, line 13 suggests that this number is the "key" output of the ILAW glass release model. Descriptions of the 14 calculation cases over the 61-page section are detailed; however, the summary section does not discuss how the numerous case results (155 results listed in Tables 5-4 to 5-6) were reduced to the value of 2.5E-07 yr^{-1}. Explain how the fractional release rate of 2.5E-07 yr^{-1} was derived and explain this value in the context of the other release rates calculated in this section.					Open	TT
105	Page 5-41, lines 26-29	What does "…normalized to the inventory of COPCs to facilitate performance comparisons" mean?					Open	DM
106	Chapter 5, Section 5.1.2.1, Page 5-43, Table 5-3	Correct the section reference for secondary mineral reaction network (SMRN) in the table, which should direct the reader to Section 5.1.2.11.					Open	TT
107	Chapter 5, Section 5.1.2.1, Page 5-45 through 5-47, Tables 5-4 through 5-6	Because they are not in order, it is challenging to find column heading explanations. Also, SMRN-4 and SMRN-5 are not explained in the footnotes for Tables 5-5 and 5-6. Finally, in the footnotes, *R = Infiltration Rate, mm/yr* should be *IR = infiltration Rate, mm/yr*. Re-order the table footnotes to match the order of the table columns, explain all acronyms in the footnotes, and correct any footnote errors.					Open	TT
108	Chapter 5, Section 5.1.2.2, Page 5-49, Lines 18 through 20	Groundwater concentration scales linearly with fractional release rate. Thus, a 26% increase in release rate causes a 26% increase in groundwater concentration. We recommend evaluating other model parameters (e.g., cementitious release rate) with finer grid resolution to see if additional increases in groundwater concentration could occur.					Open	TT
109	Chapter 5, Section 5.1.2.2, Page 5-49, Lines 31 and 32	The PA states that a higher infiltration rate was used rather than the 0.9 millimeter per year (mm/yr) that was cited as the "reference" value. The substitution is explained by saying the model run times were "excessively long" with the lower value. A previous paragraph refers to a completed simulation that took 1.5 months. Define excessively long.					Open	TT
110	Page 5-57, lines 16-21	Why was a thorough review of the STORM input file not performed? How were other models and related documents relevant? Particularly when it is noted that "it is uncertain whether parameter values used in this comparison case exactly match those used in the STORM simulations."					Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
111	Chapter 5, Section 5.1.2.5, Page 5-63, Table 5-9	Table 5-9 says that STOMP cases for higher rate constants for LAWA44 and LAWC22 are not available. Because order-of-magnitude increases in rate constants in The Geochemist's Workbench cause approximately order-of-magnitude increases in fractional release rates, these missing cases are important to simulate. Provide the STOMP cases for these higher values or explain why they are not simulated.					Open	TT
112	Page 5-83, lines 27-30	Please explain "uncertainties may not impact fractional release rates significantly". How does one know that?					Open	DM
113	Page 5-94, lines 14-18	It is noted that "it is presently unclear how the uncertainties in these separate cases should be combined to represent conditions in the IDF near field as realistically as possible…"	We are less than 48 months away from the desire to begin DFLAW processing. It seems less than adequate to at this point not be sure how results should be combined to be accurate and adequate.				Open	DM
114	Page 5-99, lines 5-7	How does one know that simple order-of-magnitude estimates are appropriate for bounding the element of concern in this case?	Provide some explanation of how that choice was appropriate and does bound needed elements so that estimates can be rational an reasonable.				Open	DM
115	Chapter 5, Section 5.1.3, Page 5-103, Perspective box	Results from the Risk Based Tool (RBT; RPP-CALC-63176) show an exceedance of the I-129 groundwater standard by more than 57% for all SSW waste streams. However, this exceedance does not appear to be further discussed in the text somewhere because the RBT is not discussed in this document. Revise this section to include additional discussion of this exceedance.					Open	TT
116	Chapter 5, Section 5.2.1, Page 5-181, Line 34	Multiple previous modeling studies in 200 Area assumed vertical dispersivity of zero, including the current version of the CPGWM (CP-47631, Rev.4). While conservative to assume a value of zero, the vertical dispersivity should have a non-zero value because of expected limited vertical mixing in the saturated zone, even over a 5-meter interval. Define "low vertical dispersivity" and confirm that it is a non-zero value.					Open	TT
117	Chapter 5, Section 5.2.1, Page 5-181, Lines 38 and 39	Item (b) "there is a high horizontal to vertical dispersivity contrast in the Hanford Formation" is an assumption and the contrast is infinite, if vertical dispersivity is zero. Revise text to list the contrast in horizontal to vertical hydraulic conductivity of the Hanford Formation, which is approximately 17.5:1 in CP-47631, Rev. 4.					Open	TT
118	Chapter 5, Section 5.2.2, Page 5-185, Lines 25-32	The flow paths and vectors shown on Figure 5-95 are discussed in Section 5.2.2.1, not this section. Remove the reference to flow paths and Figure 5-95 from this section.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
119	Chapter 5, Section 5.2.2.1, Page 5-189, Paragraph 4	The text states "similar to the importance of the vadose zone Darcy flux impacting the spatial and temporal distribution of COPC transport in the vadose zone, the local-scale saturated zone flow field beneath the IDF controls the spatial distribution of COPC transport in the saturated zone." Parameters affecting vadose zone Darcy flux are analyzed extensively in the combined vadose zone/saturated zone (VZ/SZ) sensitivity analysis in Section 5.2.3, and the vadose zone-only (VZ-only) sensitivity analysis in Section 5.2.4. These evaluations used a model that had very long run times due to the slow transport through the vadose zone. The most critical parameter governing Darcy flux in the saturated zone is the horizontal hydraulic conductivity of the H3 gravel. This parameter was not tested in the combined VZ/SZ sensitivity analysis. It was varied for only one run in the saturated zone sensitivity analysis described in Section 5.2.5 (run Gwp08), even though the SZ-only model has much shorter run times. This discussion in Section 5.2.2.1 suggests the H3 gravel hydraulic conductivity is a key parameter that should be thoroughly evaluated in the saturated zone sensitivity analysis. We recommend that a thorough evaluation of the sensitivity of model results to a range of values in the hydraulic conductivity of the Hanford H3 and Ringold Unit E gravel units is included in Section 5.					Open	TT
120	Chapter 5, Section 5.2.2.1, Page 5-189 and 5-190, Lines 45-46 and Lines 1-3	This section cites a contrast of 3,000:1 between the horizontal hydraulic conductivity of the Hanford H3 gravel and the Ringold Unit E gravel. The text suggests this large contrast "causes flow through the highly-conductive Hanford formation to divert around the Ringold Unit E through the gap in the northeast corner." This contrast is not reflected in the latest version of the calibrated CPGWM (CP-47631, Rev.4), which has calibrated horizontal hydraulic conductivity values of 15,000 and 36.5 m/d for the Hanford H3 gravel and the Ringold Unit E (east) gravel, respectively — a ratio of approximately 420:1. The CPGWM is cited as the source of the IDF model parameter values. Include a reference to the latest version of the CPGWM and its calibrated parameter values.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
121	Chapter 5, Section 5.2.2.1, Page 5-190, Paragraph 2, Line 15	The text states, "the net effect for the groundwater flow paths below the IDF is to divert from eastward courses near the western edge of the IDF model domain to northeastward courses near the eastward edge of the model domain." However, page 3-153 notes that "southeast flow corresponds with the general movement of contaminants in the area within the Hanford formation…so flow toward the southeast is now regarded as the better interpretation of the general groundwater flow direction." This latter statement is supported by potentiometric maps for three years (2013, 2014, 2015) on Figures 3-89 through 3-91, all of which indicate southeastern flow beneath the IDF. The model results contradict the underlying conceptual model presented in Section 3. Explain or resolve this conflict.					Open	TT
122	Page 5-190, lines 3-7	On what basis was it considered "reasonable" to focus the groundwater flow paths as noted in this section?	The phrases "uncertain", "reasonable", "approximately", and "difference" all in the same sentence gives pause to the accuracy and adequacy of the statement.				Open	DM
123	Chapter 5, Section 5.2.2.2, Pages 5-193 to 5-198	It is not clear how the peak activity values on Table 5-43 are calculated. The vertical height of the model cells near the water table is understood to be 0.5 m. The exposure point calculations pertain to a hypothetical well screen 5 m in height. Revise the text and Table 5-43 to clarify whether the peak activity values represent a concentration at a single model grid cell, or if they are an average of a stack of model cells that correspond to the hypothetical 5-m screened interval.					Open	TT
124	Chapter 5, Section 5.2.2.4, Page 5-221, Line 34	Replace "east" with "south and east" when describing the thinning of the Hanford Formation beyond the IDF.					Open	TT
125	Chapter 5, Section 5.2.3, Page 5-226, Perspective Box	It appears that the sensitivity analysis was not updated with the fractional release rate used in the base case VZ/SZ fate and transport model Although differences between sensitivity case results are likely to be similar, the values for time of breakthrough, time of peak, and peak activity presented in this section will not be accurate. Update the combined VZ/SZ flow and transport using the same source term applied for the base case.					Open	TT
126	Page 5-226, "perspective" and lines 6-9	There is significant uncertainty surrounding all of this information. These are assertions made without corroboration and backup.	Provide bounding and explanation for all of the disclaimers in this section.				Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
127	Page 5-228, lines 12-17	What basis of fact was used to reach an assumption that "the properties of the admix layer of the liner system are not significantly altered or degraded with time"? Given the uncertainty statement in that section, how did that assumption become credible?					Open	DM
128	Chapter 5, Section 5.2.3.4, Page 5-243, Lines 28 through 34	The paragraph states that fractional release rates are considered "nominal" values and explains that the source term used differs from the base case because of "sequencing of runs" and "long run times." The rate used in the base case (2.5E-07 yr^{-1}) is two and a half times the rate used in the sensitivity analyses (1.0E-07 yr^{-1}), which is a potentially significant difference. The text says "this ILAW fractional release rate may be compared to the value of 2.8E-08 yr^{-1} assumed in the TC&WM EIS." A comparison with the fractional release rate used in the TC&WM EIS is meaningless in the context of a sensitivity analysis, because it is not the value used in the base case. Update the combined VZ/SZ flow and transport sensitivity analyses using the same source term applied for the base case.					Open	TT
129	Chapter 5, Section 5.2.3.4, Page 5-243, Lines 36 through 38	The text states "the 2.5x higher rate is not expected to change the conclusions of the sensitivity analysis." This statement cannot be supported without a sensitivity analysis run that evaluates effects of the fractional release rate of 2.5E-7 yr^{-1}. We recommend an additional sensitivity analysis run using this higher rate.					Open	TT
130	Chapter 5, Section 5.2.3.4, Table 5-45	No calculation case results are presented for Tc-99 concentrations resulting from alternate unsaturated zone parameter sets or alternate post-compliance period infiltration rates. These were presented for I-129, but not Tc-99. The paragraph introducing this table on page 5-242 does not suggest the two COPCs are to be treated any differently; thus, the table is incomplete in its current form. Revise the table to present the case results for Tc-99 concentrations.					Open	TT
131	Chapter 5, Section 5.2.3.4, Table 5-45 and Figures 5-119, 5-120, and 5-123	Revise the figures to show the groundwater standard for I-129 (1 picoCurie per liter [pCi/L]) as a horizontal line on these figures and listed in the figure notes. Revise the table to highlight exceedances of the I-129 groundwater standard.					Open	TT
132	Chapter 5, Section 5.2.3.5, Pages 5-253 through 5-260, Figures 5-124 through 5-131	We recommend adding a summary table of results, including maximum concentrations, similar to the preceding section. This would enable comparisons of detected maximum concentrations to groundwater maximum contaminant levels (MCL).					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
133	Chapter 5, Section 5.2.3.6, General Comment	A potential waste configuration would be to store the waste in the Phase 3 portion of the IDF (the southeastern portion) in order to determine the effect of thinning of the Hanford Formation on fate and transport of COPCs, given that the location of the Hanford Formation pinchout is uncertain. This configuration was not tested in any analyses presented in this report. Please run a scenario where waste is stored in southeastern portion of the Phase 3 area of the IDF.					Open	TT
134	Chapter 5, Section 5.2.4.1, Pages 5-273 and 5-274	This introduction provides a bullet list with eight items, all of which are vadose zone parameters or characteristics tested in the sensitivity analysis. Lines 17-20 on Page 5-274 identify tables that present detailed assumptions for the first four bullets (Tables 5-46 and 5-47). No tables provide detailed assumptions for the remaining four bullets. Add text or tables that discuss the last four bullet items to maintain consistency in documentation of the sensitivity analysis.					Open	TT
135	Chapter 5, Section 5.2.4.1, Page 5-274, Paragraph 2	This paragraph describes the long-term infiltration rate to be used as a basis for the VZ-only sensitivity runs. The paragraph notes that the "the 1.7 mm/yr value long-term average infiltration rate is about one-half of the base case value of 3.5 mm/yr that has been used in the base-case analysis presented in Section 5.2.3 and used in the base case value in other Hanford performance assessments, most recently the WMA-C PA." The remainder of this paragraph attempts to justify use of the 1.7 mm/yr value as a replacement for the base case value of 3.5 mm/yr. Revise the PA to use base case values, except for the parameters undergoing sensitivity analyses.					Open	TT
136	Chapter 5, Section 5.2.4.1, Page 5-275, Paragraph 2	This paragraph describes the source term used for the VZ-only sensitivity runs. This paragraph also notes that two sets of COPC release rates are used in the VZ-only runs, and that both differ from the base case set used in the combined VZ/SZ sensitivity runs. Similar to the previous comment, consistency with the base case and other sensitivity runs should be maintained, except for the specific value or assumption being tested. If the 1.7 mm/yr value is the more appropriate base case value, explain the basis for using this value throughout the PA in Section 4.4.2 (Table 4-21), and use this value in the base case analysis and in the combined VZ/SZ sensitivity analysis in Section 5.2.1.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
137	Chapter 5, Section 5.2.4.1, Page 5-275, Lines 11 and 12	Re-run these model simulations using the base case release rate of 2.57e-7 yr^{-1}. Similar comment regarding second batch of vadose zone-only sensitivity analyses on Page 5-276.					Open	TT
138	Chapter 5, Section 5.2.4.1, Page 5-275, Lines 36-39	The discussion of SSW inventory provides the Tc-99 inventory in the HEPA waste stream, but not the I-129 inventory. Add text here describing the I-129 inventory in the HEPA filter waste stream to maintain consistency.					Open	TT
139	Chapter 5, Section 5.2.4.1, Page 5-276, Paragraph 1	This paragraph introduces the second set of source terms (fractional release rates) used for the VZ-only sensitivity runs. Revise the text to use a single set of fractional release rates consistent with the base case throughout the VZ-only analyses, unless sensitivity runs were conducted to isolate the effects of different fractional release rates (which does not appear to be the case).					Open	TT
140	Chapter 5, Section 5.2.4.1, Page 5-279, Table 5-47	Define all of the parameters in the first column. Also, revise to include a superscript "e" after them to denote effective parameters per PNNL-23711 Table 6.6.					Open	TT
141	Chapter 5, Section 5.2.4.2, Page 5-282, Lines 13-14	We recommend including a table that lists breakthrough times, similar to Tables 5-44 and 5-45, to support the conclusion that COPC breakthrough occurs earlier under the distributed recharge model than under the uniform recharge model, for all three waste forms. The breakthrough curves (Figures 5-139, 5-141, and 5-143) are provided as support, but the curves overlap, and one cannot discern which arrives first.					Open	TT
142	Chapter 5, Section 5.2.4.2, Page 5-286, Figure 5-142	Based on the sequence of figures and the discussion of the figures on Page 5-282, revise the waste form to refer to it as "Effluent Treatment Facility-Liquid Secondary Waste."					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
143	Chapter 5, Section 5.2.4.3, Pages 5-290 through 5-296	Infiltration rates applied to the nine cases are unclear because the text in the bullet list on Page 5-290 is contradicted by the text in the titles of Figures 5-146 and 5-147. The bullet list cites a long-term average infiltration rate of 1.7 mm/yr for cases *Vzp03*, *Vzp04*, *Vzp05*, *Vzp12*, *Vzp13*, and *Vzp14*. It does not cite a long-term average infiltration rate for the base case (*Vzp00*) or cases *Vzp10* or *Vzp11*. A 3.5 mm/yr value, however, is cited on Figures 5-146 and 5-147, for all six cases that were listed as having an infiltration rate of 1.7 mm/yr on page 5-290. Revise the text to clearly state the infiltration rates for each case and to use those rates consistently throughout the analysis.					Open	TT
144	Chapter 5, Section 5.2.4.3, Page 5-291, Lines 4 through 7	Similar to previous comments, re-run the sensitivity analyses for a release rate of 6.6E-3 Curie per year (Ci/yr), which corresponds to a fractional release rate of 2.5E-7 per year.					Open	TT
145	Chapter 5, Section 5.2.4.5, Pages 5-302 to 5-306	This section is not clear about the similarities and differences between the sensitivity runs illustrated on Figures 5-154 and 5-155 (Iodine-129 Breakthrough Curves for Uniform and Distributed Infiltration Scenarios), and Figures 5-156 and 5-157 (COPC Breakthrough Curves for Uniform and Distributed Infiltration Scenarios). Specifically, the following issues lack clarity: a. The characteristics that differentiate the I-129 results on Figures 5-154 and 5-155 from the generic COPC results on Figures 5-156 and 5-157, other than K_d. Clarify whether all analyses on both figures are essentially "generic COPCs" with different K_d values. b. The source of the vadose zone property set used with the model runs on Figures 5-154 and 5-155. Provide a reference or description. c. The "generic source" in the title to the graphs on Figures 5-156 and 5-157. Clarify the meaning of this phrase.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
146	Chapter 5, Section 5.2.4.5, Page 5-302, Lines 6 through 8	Table 13 from ECF-HANFORD-19-0121 lists K_d values for I-129 in the H2 and H3 formations in the 200 East Area but does not provide a reference. In addition, currently, the base case does not assume the gravels in H3 have a lower K_d than H2, which makes the base case not conservative because transport through H3 is retarded. Include the source of the K_d values for I-129 in the H2 and H3 formations. Update the IDF PA model with a lower H3 K_d value (possibly 0.068 mL/g per Table 13). Re-run the vadose zone K_d sensitivity analysis after updating the H3 K_d values.					Open	TT
147	Chapter 5, Section 5.2.4.7, Page 5-310, Lines 11 to 12	The text states: "the vadose zone properties assumed for the dike materials are presented in Section 4.4.2.1." A review of Section 4.4.2.1 revealed no presentation of the vadose zone properties assumed for the clastic dike. Revise the text to present the property values assumed for the dike materials.					Open	TT
148	Chapter 5, Section 5.2.4.9, Page 5-335, Bullet 6	This bullet presents the following conclusion: "the longitudinal and transverse dispersivity of the vadose zone materials do not significantly affect the rate of arrival or the lateral spreading of COPCs that reach the water table." This conclusion is based on a single sensitivity run under the uniform flow model with one source term (SSW). Revise to restrict this conclusion to the specific conditions tested (uniform flow model and SSW source). To be more broadly applicable, the analysis should test the distributed flow model, various combinations of vadose zone parameters, and different source terms (ILAW glass and ETF-LSW).					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
149	Chapter 5, Section 5.2.5, General Comment	The text in the introductory subsection (Section 5.2.5.1) points out the simplifying assumptions that allow rapid calculation of groundwater concentrations over a range of inputs. The most significant change is introduction of a modified source term at the water table, which eliminates need to model the vadose zone. Transport times in the vadose zone are on the scale of thousands of years, while transport times in the saturated zone are "insignificant" (less than a year), as stated on page 5-336, line 34. This provides opportunity to conduct a robust investigation of sensitivity of the saturated zone portion of the model, because model run times are a fraction of the VZ-only model. Also acknowledged is that groundwater flow rate in the saturated zone is one of the factors that most significantly affects the degree of dilution and dispersive mixing between the point the COPCs enter the saturated zone and the 100-m buffer zone boundary (see comment 12 on Chapter 5). The degree of dilution and dispersive mixing are cited as key aspects of the saturated zone affecting post-closure performance of the IDF (page 5-336, line 25). Thus, it is surprising that the primary factor affecting groundwater flow rate—hydraulic conductivity of the H3 gravel unit—is not tested in isolation. Only one run was conducted with an alternate value of hydraulic conductivity for the H3 unit (*Gwp08*), and an entire suite of other parameters are changed at once, including both horizontal and vertical hydraulic conductivities of the H3 gravel, horizontal and vertical hydraulic conductivities of the Ringold Unit E, porosity of the H3 gravel, porosity of the Ringold Unit E, and longitudinal and transverse dispersivities of the entire saturated zone. In short, every parameter under study was changed at once for this run, and thus no understanding of the effects of any one parameter can be gleaned from its results. The range of sensitivity analyses conducted on critical parameters that affect concentrations in the saturated zone at the 100-m buffer zone boundary is inadequate. Re-run sensitivity analyses that vary hydraulic conductivities of the H3 gravel and Ringold Unit E, with all other parameters held steady.					Open	TT
150	Chapter 5, Section 5.2.5.1, Page 5-337, Line 33	Revise to use the fractional release rate of 2.5e-7 yr^{-1} for ILAW glass.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
151	Chapter 5, Section 5.2.5.2, General	The Tc-99 source term was not adequately tested in the saturated zone sensitivity analysis. This section includes no discussion of results specific to the Tc-99 source term; nor does it convey results for the Tc-99 source term on any figures or in any tables. The Tc-99 source term was tested in the combined VZ/SZ and VZ-only sensitivity analyses, in spite of model run times that were significantly longer than those under the saturated zone model. Either present Tc-99 results (if available) or explain why the Tc-99 source term was not tested by application of the saturated zone model.					Open	TT
152	Chapter 5, Section 5.2.5.2, Page 5-340, Paragraph 2	Eight parameters were changed for one case (*Gwp08*) whereas just two or three were changed for the other cases. One potential explanation is that these suites of parameters used in the TC&WM EIS base case. However, this is not stated in the text. Explain this combination of parameters. Also, the text describes results of sensitivity run *Gwp08* by stating, "the increase in peak I-129 concentration averaged over a 5-m well screen from 1.7E-02 pCi/L to 7.3E-02 pCi/L, a factor of 4.3, is the same as the ratio of the decrease in saturated hydraulic conductivity (from 17,000 m/d to 3,982 m/d) as expected for an advection-dominated flow regime in which concentration scales directly with groundwater flow." The text does not mention that seven other parameters were changed for Case *Gwp08*. As a result, the outcome should be considered ambiguous. The sensitivity analysis must be re-run, changing one parameter at a time, to provide a result that indicates sensitivity of a particular parameter. Finally, on Lines 11-14, the text states the hydraulic gradient was not changed while the hydraulic conductivities were modified. If the intention of run Gwp08 was to recreate the TC&WM EIS parameter set, this intention should be clearly stated and all parameters should be changed to TC&WM EIS values.					Open	TT
153	Chapter 5, Section 5.2.5.2, Pages 5-348 through 5-352, Figures 5-183 through 5-187	These figures are not referenced before they appear in the document. Move these figures after Table 5-50 on page 5-354.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
154	Chapter 5, Section 5.2.5.3, Page 5-352, Lines 8 through 10	This sentence refers to grey highlights in Table 5-50 that do not appear in that table. Revise Table 5-50 to highlight inputs that differ from previous cases.					Open	TT
155	Chapter 5, Section 5.2.5.3, Page 5-352, Line 31 and others	These 25 model cells are not in the southeast *corner* of the facility, but in the northeastern portion of Phase 3 or southeastern portion/area of IDF. However, it would have been interesting to run model simulations where SSW-HEPA waste was stored in the southeasternmost portion of the Phase 3 area of the IDF near the pinchout of the Hanford Formation, to determine the effect of this lithologic unit change on concentration and travel time. Please conduct a simulation to evaluate waste stored in the southeastern portion of Phase 3 area of the IDF.					Open	TT
156	Chapter 5, Section 5.2.5.3, Page 5-352, Line 35	The text cites Figure 5-184 as representing the waste loading scenario under which the 5-year HEPA releases are located in five cells along the western side of a 25-cell area in the southeast portion of the grid. However, Figure 5-184 represents the single-cell waste loading footprint. Correct the figure reference in the text to Figure 5-183.					Open	TT
157	Chapter 5, Section 5.2.5.3, Page 5-354, Table 5-50	It is unusual that a key result of a sensitivity analysis run, the peak concentration of a key COPC (I-129), could not be presented in this table because it was apparently not reported in the source document (see footnote [f]) and apparently could not be extracted from the model output files. This indicates either poor planning or poor communication between the modeling team and the document preparers. All of the peak concentrations should be provided in the table, if possible. If not possible, an explanation should be provided.					Open	TT
158	Chapter 5, Section 5.2.5.4, Page 5-355, Lines 9 through 11	A west-east length of 320 m and a south-north width of 210 m results in a total area of 67,200 square meters, rather than the 63,000 square meters cited in the text. Either revise the dimensions or the area in this sentence.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
159	Chapter 5, Section 5.2.5.5, Page 5-356, 4th Bullet	The final bullet states: "the degree of dilution in the saturated zone afforded by the high flow rates in the Hanford formation is dependent on the assumed hydraulic properties of the Hanford formation and the long-term hydraulic gradient in the area, both of which are uncertain due to the low hydraulic gradient in the area." The acknowledged high degree of uncertainty in the relevant properties (hydraulic conductivity of H3 gravel and hydraulic gradient) suggests these parameters should be the focus of sensitivity analyses. However, only one alternate value of hydraulic conductivity of the H3 gravel was tested, and its effect on the results are ambiguous because it was but one of a suite of parameters that were changed for that sensitivity run (*Gwp08*). Alternate configurations of hydraulic gradient should be tested, because of the stated uncertainty in hydraulic gradient					Open	TT
160	Page 5-371 and 372	Of these potential impacts, which are primary, and which depend on others? It is not clear how these interact.					Open	DM
161	Page 5-380, lines 6 and 7	This is again a case of one uncertainty laid over other uncertainties. It is not clear whether the calculated effects are reasonable or bounded.	Explanation of the process of arriving at the calculated effects, taking into account 'layered' uncertainties.				Open	DM
162	Chapter 6, Section 6.1.1.4.2, Tables 6-3 through 6-6	Input parameters for Tables 6-3 through 6-6 are not defined. Define the parameters in the tables, their footnotes, or in the text.					Open	TT
163	Page 6-11	Please explain the rationale for arriving at the assumptions chosen in this section.					Open	DM
164	Chapter 6, Section 6.1.1.4.2, Page 6-20	Figure 6-11 is shown here before it is discussed in the text on page 6-23. Move this figure after Page 6-23.					Open	TT
165	Chapter 6, Section 6.1.1.5.2, Page 6-28, Lines 33 through 35	The text states: "models for waste-forms packaged in 55-gallon drums use common geometry parameters including waste form and backfill. These models are different in material properties, transport parameters, and COPC distribution coefficients." The text does not indicate what models are being compared. Revise this paragraph to identify the models.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
166	Chapter 6, Section 6.1.1.5.2, Page 6-29, Lines 11 through 36	The text inadequately discusses the waste container dimensions used in the nested container model. The first paragraph of the description states: *Each container contains five cells representing the discretized waste form. The use of five cells was arrived at by trial and error, experimenting with several different configurations to match releases from the process level simulations. The discretization uses five nested cylindrical shells (the innermost is a cylinder) that are connected through diffusive transport, as shown in Figure 6-16.* What follows is a series of equations to calculate the volume, outer surface area, and diffusive length of each cell. Figures 6-15 and 6-16 illustrate the abstraction from STOMP to GoldSim and the "nested diffusion box" model. There is no indication that volume V1 corresponds to the actual dimensions of a 55-gallon drum, or if it corresponds to a 55-gallon drum with a thickness of grout or paste. There is no indication of how the dimensions of the inner shells were estimated or calculated, or whether they are fitting parameters with no physical expression. Revise the text to clarify what V1 represents. Explain how the dimensions of the inner shells were estimated.					Open	TT
167	Chapter 6, Page 6-30, last paragraph, sent 31-34	RPP-CALC -61194 is not the correct document for mass balance calculations.		This is the Risk Budget Tool.			Open	JY
168	Chapter 6, Page 6-31,Table 6-16	Are the "nested diffusion boxes" the same as figure 6-19 where innermost drum represents the innermost rectangle both with encapsulation shells?					Open	JY

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
169	Chapter 6, Section 6.1.1.5.3, Pages 6-32 through 6-34	This section does not adequately present and/or illustrate the conceptualization and mathematic implementation of the B-25 box in the system. For instance, five terms in the equation (I = 1,2,3,4,5) are not explained. Apparently, they may have something to do with the five nested diffusion boxes shown on Figure 6-19, but the dimensions of these nested boxes are not specified; nor are these explicitly related to the dimensions of the encapsulating grout, which is 10 centimeters on a side. Revise the text and graphics to better explain relationships among the compacted waste, the mortar/paste layer, the two "waste form regions" and how these correspond to the five shells.					Open	TT
170	Chapter 6, Section 6.1.1.5.4, Page 6-39, Table 6-10	Line 42 of Page 6-37 provides values for half-length, half-width, and height that yield a volume of 1.56 cubic meters (m^3) by use of Equation 6-6, but the origins of these half dimension values are unclear because they are not shown or listed in Section 4.4.1.3.2, on Figure 4-27, or on Figure 6-4. Clarify how these values were derived.					Open	TT
171	Chapter 6, Section 6.1.1.6, Page 6-40: Lines 10 and 11	The PA states that short-lived radionuclides are screened out of the evaluation, but no quantitative range is provided. Define "short-lived" in both bullets, specifically in terms of half-life.					Open	TT
172	Page 6-43, lines 1-5	There is no information to indicate just how well the 3-D process-level models translated in to the 1-D abstractions.	Provide an explanation of the general results of the translation of models, with boundaries and +-percentages.				Open	DM
173	Page 6-43	Please explain how accurate the 1-D abstractions are? What is lost in using them in favor of the 3-D flow and transport models?					Open	DM
174	Chapter 6, Section 6.1.2.1, Page 6-45, Paragraph 5	It is unclear if the data (moisture content and Darcy flux) extracted from the 3D STOMP model at the gray-shaded nodes (on Figure 6-24) reasonably capture the dynamics of the process model. To support the contention that the abstraction of the 3D STOMP results captures the necessary detail, insert a figure or table that demonstrates the degree of correspondence between moisture content and Darcy flux values at STOMP model nodes with values calculated from the GoldSim aquifer elements.					Open	TT
175	Chapter 6, Section 6.1.2.1, Page 6-46, Line 38	The text states: "the GoldSim cloning method is used in the model to replicate the vadose zone and saturated zone transport model for each waste source." We recommend including a brief description of the GoldSim cloning method for readers not familiar with GoldSim.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
176	Chapter 6, Section 6.1.2.1, Pages 6-52 and 6-53, Figure 6-25(a) and (b)	The boxes on figures (a) and (b) explaining the plume width are cut off. Re-size these figures to show all information.					Open	TT
177	Chapter 6, Section 6.1.2.1, Page 6-54, Figure 6-25(c)	It is difficult to read the GoldSim elements. Also, Section 6.1.2.1 does not mention the *Slow_moving_mass_H3* and *Slow_moving_mass_H2* aquifer elements. Re-size the figure to make the element names more legible. Explain the GoldSim elements.					Open	TT
178	Chapter 6, Section 6.1.2.2.2, Page 6-60, Lines 1 and 2	Revise this paragraph to use a fractional release rate of 2.5e-7 yr^{-1}, as stated in previous comments.					Open	TT
179	Chapter 6, Section 6.1.3, Page 6-69, Figure 6-38	The figure cannot be read. Re-size this figure to make the element names more legible and improve the figure resolution.					Open	TT
180	Chapter 6, Section 6.2, Page 6-93, Table 6-18	Table 6-18 indicates the assumed Darcy flux in the saturated zone for the starting case is 70 m/yr. Add a reference to the Section in the text where 70 m/yr is estimated or derived.					Open	TT
181	Chapter 6, Section 6.2, Table 6-19, Pages 6-94 through 6-96	There are no sensitivity analyses with GoldSim using different dispersivity values in vadose or saturated zones. Please conduct sensitivity analyses with varying dispersivity values.					Open	TT
182	Chapter 6, Section 6.2.1.1.3, Page 6-98, Line 18	The second numbered bullet indicates that one of the differences between the Process Model/Comparison Case and the Starting Case is the ILAW fractional release rate. The Process Model/Comparison Case used 2.5E-7 yr^{-1}, while the Starting Case used 2.57E-7 yr^{-1}. Explain why all of the sensitivity cases that were run with the Process Model used an ILAW fractional release rate of 1.0E-7 yr^{-1} instead of the Process Model/Comparison case rate of 2.5E-7 yr^{-1} or the Starting Case rate of 2.57E-7 yr^{-1}.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
183	Chapter 6, Section 6.2.1.1.3, Page 6-99, Lines 4-5	The first model file change listed on page 6-99, line 4 (change all geometry and diffusion-related parameters to those of B25) is intended to create a Comparison Case model equivalent to the Process Model. However, Section 4.4.1.3.2 indicated that the Process Model assumed the cementitious waste was contained in both B-25 boxes and 55-gallon drums. Clarify whether these assumptions in Section 4.4.1.3.2 are accurate, and if so, how the action indicated on line 4 would provide equivalency between the Process Model and the Starting Case.					Open	TT
184	Chapter 6, Section 6.2.1.1.3, Page 6-99, Lines 4-13	Changes from the Starting Case to the Comparison Case are unclear. One of the two primary differences between the Starting Case and the Comparison Case listed on page 6-98 is the ILAW fractional release rate. However, the list of changes at the top of page 6-99 does not include the ILAW fractional release rate. If the difference in fractional release rate is addressed by changes to waste container geometry (first bullet, top of page 6-99), revise the text to say so explicitly. If not, explain how the difference is addressed.					Open	TT
185	Chapter 6, Section 6.2.1.1.3, Page 6-99, Lines 12-13	The third bullet indicates that one of the three changes to develop the Comparison Case was to "adjust the backfill diffusive length at the waste surface by successive comparisons between the system model and the process model results." However, the following discussion does not directly compare diffusive lengths at the waste-backfill interface. Table 6-20 lists the Starting Case geometry parameters for B25 waste forms, which can be compared to the Comparison Case geometry parameters for 55-gallon drums (Table 6-9) and B25 boxes (Table 6-10). The primary difference between the waste form geometry is that the Starting Case "waste" cell has a diffusive length approximately 40 times greater than any diffusive length parameter used in the Comparison Case. Table 6-21 lists diffusive lengths for the waste-to-backfill interface for the Comparison Case, but no direct comparison to a waste-to-backfill interface appears for the Starting Case. Revise the text to include this comparison because diffusive length is possibly the most important distinction between the two cases.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
186	Chapter 6, Section 6.2.1.1.3, Page 6-102, Figure 6-49 and subsequent like figures	Label all dashed lines on figures in the legend on all figures in Section 6.2 that show the 1,000-year compliance period (vertical dashed line) and All Pathways standard of 25 millirems (mrem)/yr (horizontal dashed line) when applicable. See Figure 6-132 for an example note to include.					Open	TT
187	Chapter 6, Section 6.2.1.3.3, Figure 6-63, Page 6-120	Provide a graph, similar to Figure 6-63, for the radionuclides to compare their peak groundwater concentrations at the 100-meter boundary to their respective MCLs.					Open	TT
188	Chapter 6, Section 6.2.1.4.8, General	Sensitivity analysis also should have been conducted on the K_ds assigned to the H3 gravel either by themselves or in conjunction with the H2 sensitivity simulations presented in this section. Please conduct sensitivity analyses on the H3 gravel K_d values separately and in conjunction with the H2 sensitivity analyses already presented.					Open	TT
189	Chapter 6, Section 6.2.1.4.11, General	Sensitivity analysis results are not provided for comparisons of peak groundwater concentrations to MCLs at 100-m point of compliance. Revise the text to include these results.					Open	TT
190	Chapter 6, Section 6.3.1, Page 6-214, Paragraph 3	The terms *epistemic* and *aleatoric* are introduced to describe the two types of uncertainty characterized in the PA; however, these terms are not defined. Define the terms for the reader.					Open	TT
191	Page 6-214, lines 18-26	In that section there is a comment – "…is a conservative bias (i.e., pessimism) that has been applied in the selection of many of the models and input parameters in the PA."	There is a concern that "many" is not quantified. How many of the models are characterized as pessimistic? Have the models been QA'd to ensure that model bias to one end of the spectrum or another has not skewed results?				Open	DM
192	Page 6-217, lines 15-18	Is there a standard (or at lease bounds) for "reasonable expectations"? To accept "generally agreed to" seems short-sighted.					Open	DM
193	Chapter 6, Section 6.3.2.1, Page 6-221, Lines 39-41	Tracer analysis showed a recharge estimate of 5.5 mm/yr, but the maximum value of the triangular distribution shown in the text is not 5.5 mm/yr. Also, the simulated recharge rate from PNNL-16688 for vegetated Burbank loamy sand was 5.0 mm/yr, not 5.2 mm/yr (Line 41). Revise the maximum value of the triangular distribution to 5.5 mm/yr to reflect the highest estimate.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
194	Chapter 6, Section 6.3.2.3, Page 6-233, Paragraph 3	Two apparently-contradictory sentences appear in this paragraph about uncertainty in the effective diffusion coefficient due to variations in paste and mortar formulation. Sentence 2 states: "the total uncertainty includes mix-to-mix variability which may logically be expected to occur under actual operational conditions." The final sentence states: "The minimum and maximum values chosen in the integrated system model uncertainty analysis appropriately represent grout mix uncertainty, not grout mix variability." Clarify whether the uncertainty analysis includes effects of variability in grout mix formulation.					Open	TT
195	Chapter 6, Section 6.3.3.2, , Figure 6-131	Section 6.3.3.2 discusses the analysis of uncertainty in a model output (Darcy flux) caused by variation in two types of input parameters: background infiltration rate and vadose zone property sets. The text suggests that the vadose zone property sets had little effect on the regression model. Figure 6-131 illustrates a regression model developed from this analysis that shows the relationship between normalized Darcy flux and background infiltration rate. However, the figure shows only three data points out of the 21 generated from the analysis. Revise this figure to show all data points. This would indicate the validity of the assumptions regarding effects of variations in input parameters on the regression equation.					Open	TT
196	Chapter 6, Section 6.3.3.2, Page 6-241, Paragraph 2	Table 6-39 on Page 6-242 lists variabilities in three hydraulic properties output from the vadose zone property uncertainty analysis, and states that one of the three (moisture content) varies significantly, while another (Darcy flux) does not. Table 6-39 does not clearly reflect this conclusion. The relative change in Darcy flux is very close to the base case for the 50th percentile tensorial-connectivity-tortuosity (TCT) model, but the 5% and 95% TCT models are both about 1.4 times the base case, which is close to the variability (+/- 0.5) cited to indicate vadose zone properties strongly affect the predicted moisture content. Provide a more detailed discussion of the effects of the various vadose zone parameter sets and recharge rates on these variables.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
197	Chapter 6, Section 6.3.3.2, Page 6-242, Table 6-39	The relative change decimal values (VZ/VZBase) for the 5th, 50th, and 95th percentiles for moisture content are incorrect. To facilitate reader understanding, improve organization of this table (e.g., order the relative change decimal values from low to high recharge, like the variable values above).					Open	TT
198	Chapter 6, Section 6.3.3.4, Page 6-243	This section introduces three scenarios regarding effects of leachate chemistry on K_d. It also states that these three scenarios, plus material type (H2 sand or H3 gravel), laboratory data, and analog information were used to recommend a range of K_d values, including a lower bound "conservative" estimate and a modal "best" estimate. Table 6-40 lists the ranges in K_d values derived from this analysis, for both material types, but does not list the K_d ranges derived under the three leachate chemistry scenarios. Provide the K_d ranges obtained under the three leachate chemistry scenarios.					Open	TT
199	Chapter 6, Section 6.3.3.4, Page 6-247, Table 6-40	This table lists minimum, maximum, and best estimates of K_d for a number of elements in two material types. Three of the listed elements are "ACE," "BEN," and "BUT," which are neither elements nor commonly used compound names. The terms are not defined in the table notes. Identify these three substances for the reader. On the table, uranium has a higher maximum K_d for H3 Gravel than H2 sand. We would expect the maximum Kd for H3 gravel to be lower than the H2 sand value. Also, the best estimates of uranium K_d for H2 and H3 are equal, whereas all other constituents (with non-zero K_ds) have lower K_d best estimates for H3 than for H2. Check the K_d values for uranium. We suggest adding a check in GoldSim to ensure the K_d of H3 always remains lower than the K_d in H2.					Open	TT
200	Chapter 6, Section 6.3.3.5, Page 6-249, Lines 42 and 43	This section states that the estimate for hydraulic conductivity of the Hanford Formation used is ~10,000 m/d, rather than the estimate of 17,000 m/d, which was used in all previous modeling for the IDF PA. Clarify which hydraulic conductivity was used and explain if a different value was used. Revise to state that the maximum saturated zone Darcy flux multiplier is 2.1 instead of 2.2 (21,000 m/day divided by 10,000 m/day) and correct any calculations using the incorrect value.					Open	TT
201	Page 6-249, line 31-37	More uncertainty and assumptions concerning hydraulic conductivity.					Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
202	Chapter 6, Section 6.3.3.5, Page 6-250, Line 10	This section uses a different range for Darcy flux (7 to 150 m/yr) from the values used in Section 6.2 for the sensitivity analysis of the Darcy flux in the saturated zone. Explain or correct this discrepancy.					Open	TT
203	Chapter 6, Section 6.3.3.6, Page 6-253, Table 6-41	Include the peak total dose of the Mean in the table.					Open	TT
204	Chapter 6, Section 6.3.4.1, Page 6-261, Line 24	The text (referring to Figure 6-143) concludes that "based on these results, it can be concluded that 300 realizations are adequate for performing uncertainty analyses." Specify the criteria for making this conclusion.					Open	TT
205	Chapter 6, Page 6-268	Can you explain more about the "importance" analysis? You state that the SSW-HEPA Tc99 is not treated with uncertainty.		SSW-HEPA is an important parameter for calculating dose.			Open	JY
206	Chapter 6, Section 6.3.4.2, Page 6-269 and 6-270, Table 6-42	This table lists the most important parameters for prediction of groundwater total dose over four time periods. A number of parameters related to the ILAW waste form A44 are prominent among the results, particularly for the later times. It is not clear why ILAW A44 is much more important to groundwater total dose than the other two waste forms, or whether it was the only waste form evaluated in the importance analysis. Clarify.					Open	TT
207	Chapter 6, Section 6.3.4.2, Pages 6-279 through 6-282, Figure 6-147	This figure is not introduced until Page 6-285. Move this figure after Page 6-285.					Open	TT
208	Chapter 6, Section 6.3.4.2.1, Page 6-284, Paragraph 2	This paragraph discusses the importance of the saturated zone Darcy flux, which ranges from 20 and 125 m/yr; however, it does not provide the starting value of the flux or multiplier. Provide starting Darcy flux value and multiplier, or the range of Darcy flux multipliers tested.					Open	TT
209	Chapter 6, Section 6.3.4.2.2, Page 6-284, Line 33	It is not clear what K_d range was used for H3 gravels that were simulated in the importance analysis. Add the minimum, starting, and maximum values of all parameters listed in Table 6-42.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
210	Chapter 6, Section 6.3.4.3.2, Page 6-291, Paragraph 1	The comparison of realization #47 to #1 is confusing. The text states that: "the difference in the sampled values for these two parameters can result in 3.5x(=0.88/0.25) higher doses than Realization #1." Convert this equation into a standard form. In addition, the terms in the in the mathematical operation are not well defined. However, we determined that 0.88/0.25 is the ratio of the Darcy flux multipliers from Realization #1/Realization #47. The "3.5x" is likely the fractional release rate difference between these two realizations. Add the fractional release rate values to Table 6-43 for comparison purposes.					Open	TT
211	Chapter 6, Section 6.3.4.3.3, Page 6-292, Paragraph 1	This discussion of realization #58 notes that neither Tc-99 nor I-129 appears on Figure 6-154. Explain which constituents are the main contributors to the total groundwater pathway dose curve for this realization.					Open	TT
212	Chapter 6, Section 6.3.4.3.4, Page 6-294, Paragraph 1	This discussion of realization #152 notes that neither Tc-99 nor I-129 appears on Figure 6-156. Explain which constituents are the main contributors to the total groundwater pathway dose curve for this realization.					Open	TT
213	End of chapter 6 General Comment	On graphs showing realizations #52 and 158 show a dose appearing after 9000 years but it is not Tc or I. What is the radiochemical?					Open	JY
214	Chapter 7, Section 7.2, Page 7-12, Table 7-4	In this table, correct the references to the "NCRP" and "ICRP," which are incorrectly identified as "NRCP" and "IRCP," respectively.					Open	TT
215	Chapter 7, Section 7.2.1, Page 7-13, Paragraph 1	The means to calculate the potential dose to the well driller assumes that all material removed from the bore hole will be homogenized and that the well driller will be exposed to the homogenized cuttings. This assumption is not realistic. The approach presented in this section could be used in an uncertainty discussion, but it does not represent a reasonable maximum exposure. For this acute exposure scenario, the more health protective assumption would be that the well driller will be exposed to the drill cuttings from the intercepted wastes only without dilution with the remainder of the bore hole cuttings. This would represent a reasonable maximum exposure, which would be consistent with EPA risk assessment guidelines. Recalculate the exposure dose using only the intercepted waste.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
216	Chapter 7, Section 7.3.1, Page 7-18, Table 7-6	The table includes a value for the Soil Mass Ratio (SMR) – rural pasture. Equation 7-4 describes how this value is calculated. However, when the values provided in the table for the various parameters are inserted into the provided equation, the SMR value in the table is incorrect. Correct this discrepancy.					Open	TT
217	Chapter 7, Section 7.3.2, Page 7-25, Table 7-7	The table includes a value for the SMR – suburban garden. Equation 7-10 describes how this value is calculated. However, when the values provided in the table for the various parameters are inserted into the provided equation, the SMR value in the table is incorrect. Correct this discrepancy.					Open	TT
218	Chapter 7, Section 7.3.2, Page 7-25, Table 7-7	The table includes a value for the suburban gardener ingestion rate of fruits and vegetables (IR_C) and notes that this value is from USEPA's Preliminary Remediation Goals for Radionuclides (PRG) User's Guide (queried on 10/5/2015). The current version of the user guide (queried on 7/10/2020) does not appear to provide this value and notes that produce ingestion rates used by the PRG calculator are plant-specific. Revise the text to clearly state how the proposed ingestion rates compares to the range of values available in the current guidance and why the value proposed is appropriate for this scenario.					Open	TT
219	Chapter 7, Section 7.3.2.6, Page 7-29, Line 10	On this line that defines "C_c" used in Equation 7-15, change "dose from crop consumption" to "radionuclide concentration of crop," or similar.					Open	TT
220	Chapter 7, Section 7.3.2.6, Page 7-29	Equation 7-15 on this page is used to calculate the dose from consumption of homegrown fruits and vegetables by the suburban garden resident. Inputs to the equation include radionuclide concentration of crop (C_c) and the crop ingestion rate (IR_c). The units specified on Page 7-29 for these quantities are "pCi/g" and "kg/yr," respectively; however, it is not clear if these units are based on the dry or fresh weight of crops. Equation 7-14 on page 7-28 suggests that the quantity C_c has a fresh weight basis (because the bioconcentration factors are based on the fresh weight of crop). In contrast, Table 7-7 lists the value and units of IR_c (106.5 kg dry weight/yr) as a dry weight of crop basis. Equation 7-15 does not include a unit conversion for a dry to weight crop basis, therefore, the dose calculated from Equation 7-15 would be underestimated if a fresh weight basis C_c and a dry weight basis IR_C is used. Correct this discrepancy.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
221	Chapter 7, Section 7.3.3, Page 7-30, Table 7-8	The table includes a value for the SMR – commercial farm. Equation 7-16 describes how this value is calculated. However, when the values provided in the table for the various parameters are inserted into the provided equation, the SMR value in the table is incorrect. Correct this discrepancy.					Open	TT
222	Chapter 7, Section 7.3.4, Page 7-34	Regarding the external exposure dose conversion factors (DCF) in Table 7-9, the text states that "some members of the decay chain are excluded due to the short-half-lives relative to the simulated duration." Revise the text to indicate the half-life cutoff used to exclude radionuclides from Table 7-9.					Open	TT
223	Chapter 7, Section 7.3.4, Page 7-34	The text states that a "dose multiplier" is applied to some radionuclides to mitigate the uncertainty that use of the DCFs in Table 7.9 addresses the pre-consumption presence of short-lived progeny. Values for these dose multipliers are provided in Table 7.9. However, the text does not identify the source or procedure used to determine the values. Revise the text to provide this information.					Open	TT
224	Chapter 7, Section 7.3.4, Page 7-34 and Table 7-10	This section identifies the bioconcentration factors (BCF) used for total dose from radionuclides that are presented in Table 7-10. The text does not state if the uptake of short-lived progeny (supported by its parent radionuclide) is addressed by the BCF values listed in Table 7-10 (or if it is addressed by some other procedure). Review of the BCF values listed in Table 7-10 suggests that uptake of some short-lived radionuclides is not addressed (for example, polonium-210 [half-life 138.4 days], a radionuclide that would be present and supported in soil by its longer-lived parent radionuclides, is not listed in Table 7-10). Revise this section to address the dose contribution from supported, short-lived radionuclides that would present in the waste and soil.					Open	TT
225	Chapter 8, Section 8.1.2, Pages 8-12 to 8-13, Table 8-2	Changes to the ETF-LSW source term and diffusion coefficient have led to a decrease in the ETF-LSW release rate of approximately six orders of magnitude from the TC&WM EIS. This large decrease represents a very significant change in model assumptions. The sensitivity and uncertainty analyses should include model runs with higher COPC release rates from the ETF-LSW.					Open	TT
226	Chapter 8, Page 8-15, Table 8-2, 2nd row down	If no sorption is assumed does this mean the Iodine and Technetium will arrive at the water table at the same time?					Open	JY

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
227	Chapter 8, Section 8.1.2, Page 8-20, Table 8-4	Correct the apparent typographic error on Row *Vadose Zone*, Column *Section 5.0 Results of Analysis* where the Section is given as "5.2.44" instead of 5.2.4.					Open	TT
228	Page 8-34, lines 37-41	The information here is unclear, and doesn't seem to be intuitive. The result does not seem to be supportable.	Parts of inputs are pessimistic; parts of inputs are best-estimate values. Why was this done this way?				Open	DM
229	Chapter 8, Section 8.2.3.2, Page 8-40, Paragraph 2, Line 17	The text states that "In addition, it is relevant to note that the projected release rate from the cementitious waste forms considered in the IDF PA are higher (i.e., more conservative) than the fractional release rates of between 3.0E-05 to 1.0E-04 yr^{-1} investigated in the IDF risk assessment." ETF-LSW is a cementitious waste form, as described in Section 3.3.3.3 (Page 3-245). Fractional release rates for ETF-LSW (case 07 used in the Base Case) range from 4.0E-05 to 1.2E-05 yr^{-1} for the first 1,000 years, and from 1.9E-05 to 8.2E-06 yr^{-1} for the 10,000-year period (Table 5-35). Thus, for the ETF-LSW, the fractional release rates are not more conservative. Revise the text to make this distinction.					Open	TT
230	Page 8-40, lines 4-8	The uncertainty is noted; the concern is that the assumption is to be verified during PA maintenance activities. When is this particular PA maintenance procedure going to take place?	In order for this to be relevant, the PA maintenance protocol would have to be conducted prior to commissioning of LAW to ensure that the first vitrified product out "the back end" was appropriately characterized and the dissolution rate known.				Open	DM
231	Chapter 8, Section 8.2.3.2, Page 8-41, Paragraph 2, Line 8	The text states: "in the 2001 ILAW PA supplement it was recognized the facility was underlain by the more permeable Hanford formation." Sections 3.1.4.3.2 (Hydrostratigraphy and Geologic Features of the Integrated Disposal Facility) and 3.1.4.3.3 (Integrated Disposal Facility Framework Model) did not consistently and conclusively establish that the formation at the water table was the Hanford H3 gravel, rather than the Ringold gravel. Also, the transition between the Hanford H3 gravel and Ringold gravel near the southern boundary of the IDF is uncertain and not based on boreholes beneath the IDF but contouring of geologic contacts from boreholes outside the IDF. Revise the discussion of the key factors to acknowledge both the high degree of uncertainty regarding the nature of the saturated zone below the IDF.					Open	TT

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
232	Chapter 8, Section 8.3.1, Page 8-48, Figure 8-4	This figure consists of two screen shots from the TC&WM EIS report. As such, it is blurry, and many of the legend entries are not legible. The brown-colored curve (denoting highest concentration) is not identified by call-out box. Also, the added call-out boxes obscure the information behind them. Re-size and reformat this figure to improve legibility.					Open	TT
233	Chapter 8, Section 8.3.1, Page 8-49, Figure 8-5	Explain on the graph or in a footnote that the "Benchmark Concentration" of 900 pCi/L is the groundwater standard.					Open	TT
234	Chapter 8, Section 8.3.3, Pages 8-58 and 8-59, Figures 8-9 and 8-10	These figures are screen shots from the TC&WM EIS report. As such, they are blurry, and many of the legend entries are not legible. The brown-colored curves (denoting highest concentration) are not identified. Also, the added call-out boxes obscure the information behind them. Re-size and reformat this figure to improve legibility.					Open	TT
235	Chapter 8, Section 8.3.3, Page 8-59, Figure 8-10 and Line 9	The figure is titled "Base Case." On Page 8-50, the text states that "The inventory of ^{99}Tc in ILAW glass used for many of the TC&WM EIS calculations assumed 99% of the ^{99}Tc was removed in the WTP pretreatment facility, with a resulting inventory of 288 Ci to be included in the ILAW glass." Assuming the base case is represented as one of the many TC&WM EIS calculations, this contradicts the Note under the figure which states that "ILAW Glass release assumes no Tc-99 removal from the inventory of 28,800 Ci and a fractional release rate of 2.8E-08 yr^{-1}." Revise the Note or change the Base Case.					Open	TT
236	Page 8-72, lines 11-14	More uncertainty noted here; however, why is the representativeness of data uncertain?	Provide explanation of why the data is uncertain. This is important because it affects the performance projection characteristics.				Open	DM
237	Chapter 8, Section 8.4.1, Page 8-77 through 8-78, General	This section introduces the different waste forms and discusses key assumptions related to contaminant release for the ILAW glass and most of the cementitious waste forms. This section should also discuss key assumptions regarding releases from the ETF-LSW.					Open	TT
238	Page 8-77/78	Of these uncertainties, what is the relationship of one to another? Which uncertainty takes precedence in the larger scheme of understanding production, and robustness over time? (Question refers to glass and grout)	These uncertainties are complex; any change in one or more could materially affect/cause changes in one or more of the others. It would be important to better understand the potential for a cascading effect on glass/grout characteristics.				Open	DM
239	Page 8-79	Same commentary as previous comment, only focused toward the liner.					Open	DM

Item No.	Pg. # Sec. # Para./Sent.	Comment or Question	Modification Needed	Basis/Justification	Permittee Response	Ecology Response	Open/ Close	Reviewer Initials
240	Chapter 8, Section 8.4.3, Page 8-80, Line 26	The text lists the three key characteristics of the saturated zone media that affect COPC dilution, which include the properties of the two geologic formations (Hanford H3 and Ringold Unit E gravels) and the contact between them. The text states that "these properties can be characterized by large-scale pumping tests conducted from appropriately designed and installed wells in the saturated Hanford formations near the IDF." However, other parts of the document stress the difficulty of conducting a large-scale aquifer test in the highly conductive Hanford H3 gravels. Other methods for obtaining flow parameters in the Hanford H3 should be explored, including tracer testing. Another alternative is to conduct a pumping test in an area where the wells are believed to be screened in Ringold Unit E (see specific comment 5 for Chapter 1). Revise the discussion of reducing uncertainty in saturated zone parameters to acknowledge the anticipated difficulties of collecting data in the Hanford H3 and to propose alternate data collection methods.					Open	TT
241	Chapter 9, Page 9-7,	Compare to EPA and USDOE dose? Could this matter ….why not always use the lowest value?					Open	JY
242	Page 9-10, lines 10-12	Given the previous commentary on uncertainty and lack of updated/substantiated data, this reviewer disagrees with the assertion that the PA has substantiated that the waste forms can meet applicable performance objectives and measures.	The PA is rife with statements of uncertainty and the need for future PA maintenance activities. It seems that much work on PA maintenance must be done to raise the predictability of assumptions, and to conclude that disposal of waste forms can, in fact, meet performance objectives and measures. And much work needs to be done quickly in order to support hot commissioning and operations of DFLAW.				Open	DM
243	Page 10-7	Why was data from 2008 used for BBI? Why was system plan 6 information used, and not system plan 8? Surely the later data would be more accurate and timely?					Open	DM
244	Page 10-9, lines 33-40	What does "known acceptable quality" mean? This paragraph speaks to a variety of data before 2000, 2000-2005, and "existing" data. Yet there is little in the way of precision in the language to assist the reader in understanding just what quality bounds the data.					Open	DM
245	Page 10-10, lines 24-31	As in other comments, why was 15-year-old data used? Was there no later data of acceptable quality? How was the quality of the 15-year-old data validated?					Open	DM

Documents needed: RPP-CALC-61194, from page 6-30 IDF PA , IDF-PRO-EN-54165 “IDF unreviewed disposal questions implement change control process”