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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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October 24, 2016

16-NWP-182

Mr. Doug S. Shoop, Manager
Richland Operations Office
United States Department of Energy
PO Box 550, MSIN: A7-50
Richland, Washington 99352

Mr. John A. Ciucci, President and CEO
CH2M HILL Plateau Remediation Company
PO Box 1600, MSIN: H7-30
Richland, Washington 99352

Re: Review Comment Record for the Engineering Evaluation of the 200 West Pump and Treat Influence on Groundwater Monitoring for the Low-Level Burial Ground Trenches 31 and 34, SGW-59564 Rev 0

References: See Page 2

Dear Mr. Shoop and Mr. Ciucci:

This letter transmits the Department of Ecology's (Ecology) Review Comment Record (RCR) for the Trenches 31 and 34 groundwater engineering report that will support the Solid Waste Operations Complex Dangerous Waste Part B Permit Application. The enclosed RCR documents Ecology's review comments on report SGW-59564. Report SGW-59564 (Reference 1) is not a formal *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8c, for the Treatment, Storage, and Disposal of Dangerous Waste* (Permit) transmittal, but allows for an early review before the United State Department of Energy (USDOE) develops the groundwater monitoring plan for the Permit.

Ecology provided requirements and expectations for the Trenches 31 and 34 groundwater engineering report (Reference 2).

USDOE provided a presentation, SGW-59566-VA (Reference 3), and evaluation report, SGW-59564, (Reference 4) that evaluated the 200 West Pump and Treat on groundwater monitoring for Trenches 31 and 34. Ecology provided comments on the evaluation report, SGW-59564 (Reference 5).

Ecology identified several elements of the engineering report SGW-59564 that were inadequate or incomplete, and a number of technical items, as identified in the RCR. Some significant comments include:

- Provide adequate explanation and corresponding references on the use of the Central Plateau Groundwater model to justify the conceptual model used including validation, calibration, QA/QC, and related issues. Provide adequate supporting information on the construction, basis and results of the model and simulations.



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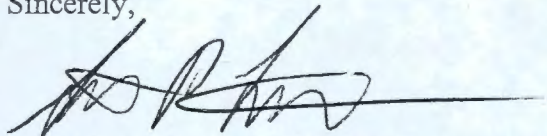
Mr. Shoop and Mr. Ciucci
October 24, 2016
Page 2 of 3

- Provide the basis for the locations of the existing wells and proposed locations of planned wells that are not on the point of compliance.
- Provide a complete evaluation process and selection of dangerous waste constituents subject to groundwater protection requirements.
- Provide specific method(s) to evaluate and respond to changes in the groundwater flow regime.

Ecology would like to meet as soon as possible after you have reviewed and considered the attached comments to discuss and plan for completing the engineering report.

If there are any questions, please contact me at stuart.luttrell@ecy.wa.gov or (509) 372-7883.

Sincerely,



Stuart Luttrell, Acting Project Manager
Waste Management Section
Nuclear Waste Program

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Enclosure

cc: See page 3

References:

1. Letter 16-AMRP-0242, dated August 26, 2016, "Engineering Evaluation of the 200 West Pump and Treat Influence on Groundwater Monitoring for the Low-Level Burial Ground Trenches 31 and 34, SGW-59564, Revision 0" 1240073
2. Letter 15-NWP-157, dated August 13, 2015, "Groundwater Monitoring Requirements for Low-Level Burial Grounds Trenches 31/34 Permit Modification to the Hanford Facility Resource Conservation and Recovery Act Permit Dangerous Waste Portion, Revision 9, for the Treatment, Storage, and Disposal of Dangerous Waste" 1230858
3. Presentation SGW-59566-VA, December 8, 2015, by USDOE and CHPRC to Ecology, Low-Level Burial Grounds (LLBG) Trenches 31/34 Groundwater Monitoring
4. Evaluation Report, SGW-59564, received February 4, 2016, Evaluation of 200 West Pump and Treat on Groundwater Monitoring for Trenches 31 and 34 1240074
5. Letter 16-NWP-077, dated April 27, 2016, "Department of Ecology's (Ecology) Response to the Draft Evaluation of 200 West Pump and Treat on Groundwater Monitoring for Trenches 31 and 34, SGW-59564, Rev. 0 Report" 1238275

Mr. Shoop and Mr. Ciucci
October 24, 2016
Page 3 of 3

16-NWP-182

cc electronic w/enc:

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Review Comment Record	Washington State Department of Ecology, Nuclear Waste Program	Date: October 12, 2016
		Page 1 of 11

Document Title/Number: Engineering Evaluation of the 200 West Pump and Treat Influence on Groundwater Monitoring for the Low-Level Burial Ground Trenches 31 and 34, SGW-59564 Rev. 0			
Document Reviewers: Stuart Luttrell, Jeff Ayres, Joe Caggiano, Dwayne Crumpler, Dib Goswami	Project Manager: Stuart Luttrell (Acting)	Facility Site ID	Cleanup Site ID

Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
1	General	Verify that the simulations are representative compared to observed parameters, especially dispersion. Several assumptions are used, but with no discussion that they have been tested by measured data.	Please address lateral dispersion of contaminants modeled compared to real data on contaminant dispersion as a check on reality.	Technical basis and completeness.				
2	General	Discuss the injection of 200-BP-5 groundwater and 200-DV-1 perched water in the text. Acknowledge it is included in the volumes in the tables and the simulations.	Acknowledge that injection of 200-BP-5 groundwater is included in the volumes in the tables and the simulations.	Technical basis and completeness.				
3	General	Specific documents and the information used for the model is not specifically identified. Factors such as assumptions, boundary conditions, discretization, and input parameters (especially variables) are not identified.	Provide references to specific documents and identify the information used for the model that is provided in those documents. Identify factors such as assumptions, boundary conditions, discretization, and input parameters (especially variables).	Technical basis and completeness.				
4	General	Limitations and uncertainty associated with the model and simulations is not adequately discussed. The CPGWM is a 3-D model, and the injection well screens are completed at depths greater than 70 ft below water table. Where in the 3-D system do the particles move? What is the effect of vertical flow on the simulated particle pathlines or in actual measurements or conditions?	Provide additional discussion on these limitations.	Technical basis and completeness.				
5	General	Prediction analysis does not address or account for current remediation approaches (e.g. ROD) and possible changes. For example, what is the effect of stopping the injection in 10 years?	Discuss future prediction analysis taking into consideration the current remediation approaches (e.g. ROD) and possible changes, for example stopping the injection in 10 years.	Technical basis and completeness.				
	General	Details on the current conceptual model, numerical model validation, and the conservativeness observed in the current remedial approach are not complete. (Including history, QA/QC, and the process followed).	Provide the proper citation of the current conceptual model, numerical model validation, and the conservativeness observed in the current remedial approach (history, QA/QC, and the process followed).	Technical basis and completeness.				
	General	Are there plans to conduct vertical profiling in the proposed wells to detect chemistry changes in the upper part of the aquifer due to injected water from the P&T system?	Defer this to be included as part of the detailed groundwater monitoring plan.	Technical basis and completeness.				
	General	As-built well construction diagrams should be provided for the pump and treat wells and for all existing wells and proposed wells in the proposed groundwater monitoring network. We cannot evaluate whether requirements of WAC 173-303 are met unless this information is provided.	Provide well construction diagrams for the pump and treat wells, the existing wells, and the proposed wells.	Technical basis and completeness. 173-303-806(4)(a)(xx)(E); 173-303-645(8)(a)				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016	Page 2 of 11	
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P. 1-1, L: 31-33	Not all requirements in letter 15-NWP-157 are addressed in the report. Specifically, the "approach, input data, any additional information needs, and analysis proposed to evaluate and respond to changes in the groundwater flow regime..." are not provided. This is key to evaluating and maintaining a compliant groundwater monitoring network. What information is necessary, what analyses are required, and what actions would be taken if the conditions change?	Provide the approach, input data, any additional information needs, and analysis proposed to <u>evaluate and respond to changes in the groundwater flow regime</u> as it evolves over time under the influence of the adjacent IW(s). Discuss the alternative responses that would be taken based on the results from simulations and monitoring. Would new wells be planned?	letter 15-NWP-157 WAC 173-303-645(9)(h)				
	P.1-1, L: 35-39	Implementation of this plan is not subject to documentation of a release. Implementation will begin when the permit is issued. There is no discussion in the report on documenting evidence of or responses to a leak based on leachate monitoring results.	Clarify this discussion to state implementation of the plan is when it is put in the permit. Describe how the leachate monitoring results will be evaluated or delete this sentence.					
	P. 1-2, L: 32	Is the number 40 a Typo error?	Correct the typo error on this line.					
	P.1-5 L: 8	What does "WAC 173-303-compliant" mean?"	Clarify the meaning of this statement.	Clarify regulatory requirements.				
	P.1-5, L:10	Is this sentence stating that the leachate collection /leak detection system has not indicated a leak in the system? The statement, "...there has not been a release (e.g., leakage) from LLBG Trenches 31 and 34" is unclear.	Provide more detail of what "not been a release..." means and supporting information for the statement.	WAC 173-303-665				
	P.1-5 L: 12-13	Does the volume of 21,000 m ³ include one or both trenches? The Part A states the capacity is 21,000 m ³ for each trench.	Correct this to be consistent with information in the Part A and other Addenda.	Technical basis and consistency.				
	P.1-5 L: 22-23	Trench 94, not Trench 34, is designed for receipt and disposal of defueled nuclear reactor compartments.	Remove the sentence pertaining to Trench 94.	Technical basis and completeness.				
	P.1-5, L:33	This has no direct relation to this report or the groundwater monitoring system.	Remove the sentence.					
	P. 1-5, L: 35, 36; and P. 1-6, L: 5, 6	Well 299-W10-31 is mentioned as currently used for monitoring, but there is no mention whether to use this well in final status monitoring. Explain reasons for deleting this well.	Provide in this report why well 299-W10-31 was removed from the monitoring well network for the Trenches 31 and 34.	Clarification of text.				
	P.1-8, Figure 1-4	Well 299-W10-26 is missing from this figure, but the well is used to show water level calibration in Chapter 5.	See comment. Provide the location of well 299-W10-26.	Technical basis and completeness.				
	P2-1, L: 26	Typo error, correct to: "does not appear to the be present..."	See comment for correction suggestion.					
	P.2-1, Sec. 2.1, L:29	Provide how thick the Hanford formation is <u>under the trenches</u> . Provide what occurred to the Hanford H3 unit.	See comment.	Technical basis and completeness.				
	P.2-1, Sec.L:29	I believe the wrong "formally" is being used. Change to "formerly" or "previously known as".	Change to "formerly known as"	Accuracy.				
	P.2-3, L:10-21 and 2-4, L 1-4	Provide the general strike and dip of each of these units.	Provide enough detail to understand fluid migration in the stratigraphic units.	WAC 173-303-645(4)(b)(i)(B)				
	P.2-4, L: 35	Clearly state which site or facility is being referred to here.	Identify this as the SALDS, not the "permitted facility" so it is not confused with Trenches 31 and 34.	Accuracy.				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016	Page 3 of 11	
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.2-6, L:5-6	Provide the current treatment capacity for the 200 West Pump and Treat. The report mentions an increase of the capacity to 3,750 gpm. Evaluate the impacts of this rate. The evaluation and report will need to be revised in the future if the treatment system does increase; the engineering report should not need to be revised, but should consider all future operations possibilities.	See comment. Evaluate all bounding conditions, including 3,750 gpm.	Technical basis and completeness.				
	P.2-6, L: 7	Is the value 0.4 m an annual rate?	Clarify this.	Accuracy.				
	P.2-6, L:11-12	Provide when the "completion of the P&T remedy" will be (current plans) and which wells are discussed. Some wells have declined 15 ft, while others have risen 6.6 ft.	See comment.	Technical basis and completeness.				
	P.2-6, L:23-24	For consistency with Sec. 1.1 (P.1-5, L14), add "to 12.2 m (30 to 40 ft.). Note, the significant figures used in the units does not appear to be consistent.	See comment.	Consistency.				
	P.2-6 Figure	It is hard to tell if the data points and trend lines from W10-29 are covering the points and lines from W10-30.	Review graph. Perhaps a note in the figure itself would clarify this.	Accuracy.				
	P.2-7, L:5	Should be 43 ft., not 42 to be consistent with P.2-4, L: 3. Thirteen meters represents 42.6 or 43 ft. Please change.	See comment	Rounding error and consistency with P.2-4.				
	P.2-7, L:16-20	Delete these sentences and tell "how affected" these facilities were.	Provide how the groundwater was affected "After the startup of Hanford Site operations."	Unclear what the affects were.				
	P.2-7, L:23-25	Provide why water table maps for 2000 and 2005 are referenced but not provided. Why are these important versus any other year?	Provide more detail as to the importance of these two water table maps (2000 and 2005).	Unclear why these maps are being referenced.				
	P.2-9, L: 6-8	Figure 2-7 shows 3 injection wells near Tr. 31 and 34. List all 3 here: 299-W10-35, W10-36 and W15-226. Injection well W6-14 is not discussed elsewhere, so remove it.	Remove well W6-14 and add the injection wells W7-14 and W15-226 in the discussion.					
	P.2-9, Figure 2-7	Provide water elevation values for each well for completeness.	Provide values of water elevation at each well.					
	P.2-9 L: 10	Typo error on the velocity value (0.2.4).	Correct the decimal point.	Accuracy.				
	P.2-10, Figure 2-8	Provide water elevation values for each well for completeness.	Provide values of water elevation at each well.					
	P.3-1, Line 3	Clarify in this paragraph that the trenches are monitored under interim status requirements for indicator parameters.	Provide the clarification for completeness.	Technical basis and completeness.				
	P.3-1, Sec. 3.1	This conceptual site model does not discuss fate and transport of contaminants in groundwater. The report is to support groundwater monitoring, so groundwater must be addressed in the conceptual model.	Provide bullet points regarding groundwater fate and transport in this section.	Hydrogeologic setting, WAC 173-303-645				
	P.3-1, L: 20-21	Provide if any nearby water lines or waste lines are present.	See comment	Hydrogeologic setting, WAC 173-303-645				
	P.3-1, L: 29-36	This discussion assumes migration is by movement of a uniform "front". A preferential pathway is not considered in the conceptual model. Provide a basis for the assumption.	Provide information that supports the conceptual model of distributed flow.	Hydrogeologic setting, WAC 173-303-645				
	P.3-2, L: 28-32	This statement is unsupported. The CCU creates a dominant spreading horizon as demonstrated at other sites	See comment.	CCU provides a lateral spreading horizon in 200				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016		
						Page 4 of 11		
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
		in 200-West Area. What is the potential effect of lateral spreading of injected water beneath trenches 31, 34?		West Area that has been very well documented.				
	P.3-3, L: 1	This very strong assumption does not consider unexpected events, aquifer boundary changes, or operational changes. A statement of uncertainty in regards to changes in the pump and treat operation from 2015 to 2037 is needed.	Discuss assumptions, and how they will be addressed if they aren't met.	Technical basis and completeness.				
	P.3-3, L:22	Identification of upgradient sources is needed to understand the groundwater flow regime, groundwater chemistry, and the groundwater monitoring system design.	Provide what are the "other sources in the 200 West Area" and the impacts on groundwater chemistry beneath Trenches 31 and 34.	Hydrogeologic setting, WAC 173-303-645				
	P.3-3, L:30	The term "low and close to the DWS for nitrate (45 mg/L)" is an inadequate description.	Provide the actual concentration (or range) from measured data.	WAC 173-303-645(5).				
	P.3-3, L: 33-35	The first sentence in the paragraph is misleading and out of context. This section should discuss just waste.	Delete the sentence and focus the section on the dangerous waste constituents.	Scope and context. WAC 173-303-645(4)				
	P.3-3 and after, Sec. 3.2; and Table 3-1	The constituent evaluation and selection process needs more discussion and needs to provide why certain analytes are eliminated and others are retained. See also specific comments below.	Provide more detail on the process of decision making for waste constituent analysis.	WAC 173-303-645(4) and (9)(a).				
	P.3-3, L: 24-31	List all plumes. Plumes are defined as constituents that have been detected, not just above a standard.	See comment.	WAC 173-303-806(4)(a)(xx)(D)				
	P.3-3, L: 41	Reference is made to the waste inventory; however, the constituents to consider must include those listed in the Part A and that are subject to groundwater protection requirements.	Review the requirements and provide the full required evaluation.	WAC 173-303-645(4)				
	P.3-4, L: 1-2	Dangerous constituents to consider are those subject to groundwater protection requirements. These constituents are in "Ground-Water Monitoring List" <i>Chemical Testing Methods for Designating Dangerous Waste</i> .	Review the requirements and revise this. Note that the department will specify in the facility permit the dangerous constituents to which the groundwater protection standard applies.	WAC 173-303-645(4)(a)				
	P.3-4, L: 6-17, and 33	This states the general process for selecting dangerous constituents and indicator parameters, but rationale for each constituent selected or not selected is not clearly described.	Provide the rationale for including or excluding each dangerous constituent.	WAC 173-303-645(4)(a)				
	P.3-4, L: 12	Add to the end of the sentence, "by the Department of Ecology." The permittee cannot exclude constituents.	See comment. The Department will exclude constituents based on criteria listed in (4).	WAC 173-303-645(4)(b)				
	P.3-4, L: 13-14; L: 33.	Add the words, "stability and persistence" to correspond to the regulations.	See comment.	WAC 173-303-645(9)(a)(ii)				
	P.3-4, L: 30-33	The citation to WAC 246-290 has no basis in this plan. This plan is regulated under 173-303.	Remove the citation to WAC 246-290 and any inference or conclusion based on this.	Correct regulatory citations.				
	P.3-5 Table 3-1	What does the "percent of total waste volume" column represent?	Clarify what the percent of total waste volume column means.	Clarification.				
	P.3-5, 3-6, Table 3-1	Carbon tetrachloride, tetrachloroethylene, and vinyl chloride have a large inventory and are far over MCLs. All constituents must be evaluated. Why especially are these not evaluated further?	Provide an evaluation of all dangerous constituents as appropriate.	WAC 173-303-645(4)				
	P.3-7, Table 3-2	Provide all the waste constituents that were detected, not just the ones above the MCL or MRDL. Constituents in	See comment. Provide all the waste constituents that were detected.	WAC 173-303-645(4)				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016	Page 5 of 11	
Item No.	Page, Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
		leachate may indicate releases from the wastes, which could migrate to the environment.						
	P.3-7, Table 3-3	Provide a justification why some constituents on the Part A form are not indicator parameters (hexavalent chromium is not listed, but the mobility is mentioned in Sec. 3.1).	Add hexavalent chromium to Table 3-3 or discuss why it is not included.	WAC 173-303-645(4)				
	P.4-1, L: 5	This cites Rev 0, but rev 2 is the most recent, and it includes version 6.3.3 of CPGWM. Clarify the origin and evolution of the model in relation to the versions cited. Provide all the modeling reports cited throughout.	Provide the correct reference or state why Rev 2 is not cited. Provide all the modeling reference documents.	Completeness and basis.				
	P.4-1 Sec. 4.1	The simulation scenarios do not describe the source or basis for the scenarios provided and for the 2037 end date.	Provide the basis for the simulation scenarios.	Technical basis and completeness.				
	P.4-2, L:15-16	Based on Table 4-1, the text needs to add "and IW 299-W15-226" to scenario F.	See comment.	Both injection wells are not pumping.				
	P.4-2, L:17-22; and P.6-6, equation on L: 12	There is no discussion on why the scenarios are weighted as they are, and the assumptions of these weights. This is important when determining relative detectability. Bounding conditions do not seem to adequately be identified and applied in the detectability calculations, but they were considered in SGW-59566-VA. See other comments.	Provide the basis for the scenarios weights, and associated assumptions. See comment.	Technical basis and completeness.				
	P.4-2, L:23-24	Details on scenario 3 are lacking, such as what time period it covers and when contaminant releases occur.	Provide more detail on Scenario 3. Provide what time period it covers and when the contaminant releases occur. See comment.	Technical basis and completeness.				
	P.5-1, L:6-26	Provide more detail on hydraulic containment as it relates to groundwater elevations. What information was used to calibrate water elevation simulations?	Provide information reported in or cite specific sections of the 200 Area Pump and Treat report. That report provides data that demonstrate how the water elevations calibrate to the field data. See comment.	Technical basis and completeness.				
	P.5-1, L:21-26	These bullets state there are areas where confidence in the results is relatively high and where it is lower. This is important to know for evaluating uncertainty associated with the scenario simulations.	Discuss the areas where confidence is higher and lower in relation to the vicinity of Trenches 31 and 34.	Technical basis and completeness.				
	P.5-1, L:27-29	What does it mean on line 27 that "Calibration targets for the CPGWM were updated...?" What is the "validation calibration data set" in line 29 and how is it used? Are parameters in the model updated?	See comment. Provide additional discussions on these terms.	Technical basis and completeness.				
	P.5-1, L:27-28	Provide when "continuous and manually measured water-level data" began. Provide if these "daily average water-level values" are mean values collected over minutes/hours or one time a day.	See comment. Discuss the meaning of the average daily water-level values.	Technical basis and completeness.				
	P.5-1, L:29-32	Provide more detail on the simulated vs. measured water levels. Provide maps that illustrate the level of comparison between the interpolated capture frequency map (ICFM) and simulated capture frequency map (SCFM).	See comment.	Technical basis and completeness.				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016		
						Page 6 of 11		
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.5-1, L:33-35	Provide and discuss the statistical evaluation of the validation results (see SGW-59566-VA). Provide the level of confidence as it relates to statistical analysis.	See comment.	Technical basis and completeness.				
	P.5-1, L:33-35	Provide when the calibration period occurs. Based on this section, the calibration period is never stated.	See comment.	Technical basis and completeness.				
	P.5-2, Figure 5-1	The simulated and measured water levels are not shown in any legend. Well 299-W10-26 is not provided on a map to show its location. Refer to Figure 1-4.	See comment.	Technical basis and completeness.				
	P.6-1-6.3, Sec. 6.1	Provide more discussion of the Scenario 1 Dilution Curves. How are the dilution curves applied? Are water chemistry results available to evaluate the changes caused by dilution from the injection well?	See comment. More discussion is needed on the dilution curves and the range of values achieved. Provide measured data from wells, if available, to evaluate if the dilution curves are reasonable.	Technical basis and completeness.				
	P.6-3, L: 38-44	It is hard to follow the graphs to the discussion for these figures. In line 38 add "breakthrough" before the words "dilution curves" and, clarify the intent of "dilution" here to distinguish it from the word as used in section 6.1.	See comment. Also, clarify the intent of "dilution" here to distinguish it from the word as used in section 6.1	Technical basis and completeness.				
	P.6-3, L: 44	At the end of the sentence, add "at year 2037." Provide a cumulative curve to understand if 100% of the release volume has been detected by 2037."	See comment.	Technical basis and completeness.				
	Sec. 6.4	Please explain the "unit concentration" used on Figs. 6-6 thru 6-9 (and elsewhere) and how these were used in contouring simulated plumes.	Explain if this concentration is the percent of the original injected water or something else. How are these used in developing plume maps?	Technical basis and completeness.				
	P.6-5, Table 6-1	The MDL is not the appropriate measure of detectability. The PQL must be used for this evaluation, and will affect the conclusions. 1,1,1-trichloroethane has a 0% in the All Scenario column. Is 0% correct? If not, provide the actual percent value range.	Use the PQL for the detection limit. See comment.	Technical basis and completeness.				
	P.6-6, L: 12-19	What is the basis for this equation? The equation is not intuitive. An example or description of each parameter and how changes to that parameter will affect the relative detectability results would be helpful.	Provide the basis for the detectability equation.	Technical basis and completeness.				
	P.6-6, L: 26-34	Provide the basis for locating the three new monitoring wells in a north-south line with W10-30 and W10-29 instead of next to the unit on the point of compliance.	See comment.	WAC 173-303-645(6).				
	P.6-7, P.6-10, Sec. 6.5	Provide a better description what the dilution curves and release breakthrough curves represent. Provide simulations and discuss results for a "virtual well" located at the proposed well locations and the point of compliance. The comparison between a virtual well and the planned locations may be useful to make the case that wells may be located farther from the point of compliance.	See comment.	Technical basis and completeness.				
	P.6-9, Figures 6-8 and 6-9	Provide similar discussion as for Scenario 1. Provide when 10% of the waste release is detected at X years. Provide the range is between X and Y at year 2037.	See comment.	Technical basis and completeness.				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016	Page 7 of 11	
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.6-10, L: 2	Provide the same headings as in Scenario 1 for consistency.	See comment	Consistency.				
	P.6-10, L: 4	Change "Scenario 1" to "Scenario 2"	See comment	Accuracy.				
	P.6-13, Figure 6-12	Provide a more complete description of what this figure represents. What does 0.0 concentration in 2037 indicate? When does the release occur? When will dilution for these wells return to pre 2012 or pre-Hanford conditions?	See comment	Technical basis and completeness.				
	P.6-13, L: 4-13	Provide the actual range for the constituents. As presented, 0.5% is significantly higher value than 0.02%. Provide a better discussion of the conclusions here as it relates to detectability, dilution and breakthrough curves for releases.	See comment	Completeness.				
	P.6-14, Table 6-3	Explain why the last column has the same range values (e.g. 0.02%-0.02%). It is unclear why no range would exist.	See comment	Completeness.				
	P.6-14 L: 3-7	The monitoring network presented does not reflect a bounding set of conditions although that was an objective of this evaluation (P. 4-1, P. B-6). Presentation SGW-59566-VA, slides 34 and 35, identified a region to "improve monitoring robustness" based on multiple pathlines crossing the south boundary of Trench 34. Slide 36 proposed a well in the approximate location of dry well 299-W10-13, but this is not mentioned at all in this report. If the path lines have no direct relation to the relative detectability results, please discuss that. Is it because the particles in some pathlines are insufficient to conclude that a contaminant could even be detected?	Explain why pathlines crossing the south boundary are not considered to be bounding conditions. Evaluate and discuss the need for a well in the approximate location of dry well 299-W10-13.	Technical basis and completeness.				
	P.7-1, Sec. 7	I recommend removing any discussion on monitoring frequency and evaluation from this section. Rather, refer entirely to the groundwater monitoring plan that will be submitted. The focus of this should be on the monitoring network design.	Remove discussion of frequency and evaluation.	Scope and completeness.				
	P.7-1, L: 4-5	Remove the sentence that states the section describes the final status monitoring program. It does not do so.	Remove the sentence.	Scope.				
	P.7-1, L: 24, 25	Use the correct language for the relation of the point of compliance to the waste management area. It is not necessarily the location "as near to the source..." and is not defined in WAC 173-200 or WAC 173-218.	Correct the terminology used and the regulatory requirements cited.	WAC 173-303-645(6)				
	P.7-1, L: 24-27	These are inappropriate regulatory citations and do not apply to requirements under 173-303-645.	Remove the inappropriate regulatory references.	Correct regulatory requirements.				
	P. 7-1, Sec. 7.1	There is no evaluation of placing the new wells on the regulatory point of compliance. There is a short discussion stating that overhead lines, equipment, and roads restrict the placement of wells. It may actually be possible to place wells close to the point of compliance; it	Provide an evaluation of breakthrough curves in wells located closer to Trenches 31 and 34 and in relation to the existing and proposed wells.	WAC 173-303-645(6)				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016		
						Page 8 of 11		
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
		just would require some extra efforts. See additional comments.						
	P.7-2, L 5-6	Provide the criteria for the wells to be 45 ft. from power lines and 90 ft. from roads. One can install a well in the middle of the road, if necessary.	See comment	WAC 173-303-645(6)				
	P.7-2, L: 9-10	The regulation cited, WAC 173-218-030, is not applicable to this TSD unit. It should be WAC 173-303-645(6). Please change to the correct regulations. In addition, it is a regulation/requirement, not guidance. Change from "guided" to "required."	See comment. Correct the regulatory citation.	Appropriate regulatory citation. WAC 173-303-645(6)				
	P.7-2, Sec. 7.2, L: 24-25	Delete the last sentence or revise it to state a release has not been documented. Unless soil samples have been taken from under the unit, this statement as written is not correct.	Revise the last sentence or delete it. See comment	No basis on which to support this statement				
	P.7-3 to P.7-4, Sec. 7.2.1	Provide how "Future groundwater flow direction may be impacted by ongoing 200 West P&T operations." Analysis shows this well is directly in the upgradient flow path only when pumping is ceased (Scenario 3) (Figure 7-27). Please provide this statement clearly in the text.	See comment	Analysis show this well is in flow path only for Scenario 3				
	P.7-3 to P.7-4, Sec. 7.2.2, 7.2.3, 7.2.4, 7.2.5, and 7.2.6	Provide how "Future groundwater flow direction may be impacted by ongoing 200 West P&T operations." This statement implies this analysis is uncertain and that flow direction will change from today through 2037. Provide the impacts of this uncertainty and the approach to measure real conditions and adjust the simulations and the network based on changes observed.	Clarify the level of uncertainty in the future flow direction. Provide the impacts of this uncertainty and the approach to measure real conditions and adjust the simulations and the network based on changes observed.	Technical basis and completeness.				
	P.7-3, L: 14	Clarify if this is (8)(i) or (8)(a)(i). It appears to be (8)(a)(i).	See comment.	Appropriate regulatory citation				
	P.7-3 to 7-5	In several places, change the citation to read "(8)(a)(ii) and (iii) and delete the first "and"	See comment.	Appropriate regulatory citation				
	P.7-4, L: 9-11	Why are the planned wells in the best locations? Results do not adequately demonstrate this.	Discuss why the current and planned locations are the best. Provide simulation results of breakthrough curves of a source release for the proposed new wells and at the point of compliance. I believe comparison and evaluation of these results would be meaningful.	WAC 173-303-645(6) Technical basis and completeness.				
	P. 7-1, L: 28-29 and P.7-5, L: 19-25	The influence of the injection wells on "background" is not addressed. Injected water has raised the water table in upgradient well 299-W9-2 and changed the hydrologic regime since 2012. Groundwater in well 299-W9-2 will not be representative of groundwater passing the point of compliance. This must be addressed because it establishes the basis for the groundwater monitoring statistical approach in the monitoring plan.	Review the feasibility of using well 299-W9-2 for establishing background in view of the effects of the injection water.	WAC 173-303-645(8)(a)(ii)(iii) and WAC 173-303-645(9)(f).				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016	Page 9 of 11	
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.7-5, L: 14-18	Provide the regulatory citation(s) for these bullets.	See comment.	Appropriate regulatory citation				
	P.7-5, L: 21-23	This sentence seems to be redundant with the 2 nd bullet in this section. Review and consider deleting this sentence.	See comment.	Redundant in this section.				
	P.7-5, L: 30-32	See previous comments regarding dangerous waste constituent evaluations and indicator parameters.		WAC 173-303-645(5)				
	P.7-5, L: 32-36	Defer the discussion of sampling and analysis frequency to the monitoring plan. (The basis for frequency of sampling and statistical analysis is not adequately described).	Provide the statistical approach and methods in the monitoring plan.					
	P.7-6, Table 7-2	Remove this table from the engineering report, and put it in the monitoring plan.	Put the table of sample frequency in the monitoring plan.					
	P.7-6, Table 7-2, footnote e	Provide what "anion analytes" will be monitored in relation to the statement, "Analytes include, but are not limited to,"	See comment.	WAC 173-303-645(9)(a)				
	Appendix A	Provide the time period over which the sample results range in Appendix A. Provide if it covers the entire operating period for Trench 31 and 34.	See comment.	Completeness.				
	Appendix, Table A-2	What is the explanation for large cations appearing in the leachate samples? One possibility is failure of the liner. Please address.	Explain why there are large cations in the leachate samples.	Technical basis and completeness.				
	Table A-2	The "Reported Values" data are not in every case provided in the same units. I suggest a note of caution be provided so one does not inadvertently miss-interpret the values.	Provide a note indicating all results are not presented with the same units.					
	Appendix B	More discussion of the curves, dilution maps and detectability maps are needed in this document. Provide more discussion as to the magnitude of the dilution, why Scenario 3 starts at 0 instead of where the dilution is in these wells at the end of the simulation.	See comment.	Unclear what data represents at the starting and ending points and how dilution/breakthrough curves represent the process.				
	P. B-1,	Provide the reference to the current monitoring plan (DOE/RL-2009-68, Rev 2).	Provide a reference to the current monitoring plan.	Completeness.				
	P.B-2, L: 19,20	Remove reference to 299-W6-14 and include 299-W15-226. The latter well is included in other discussions throughout.	Remove reference to 299-W6-14 and include 299-W15-226.	Completeness and accuracy.				
	P. B-4, Sect. 2.1.1	Has the CPGWM been tested by using real historical data to simulate the spread of certain contaminants in 200 West Area? (What is its pedigree?)	Please provide at least a summary rather than a series of other documents.	Technical basis and completeness.				
	P. B-4, ln 34-37.	As stated, you are using the results from one model (CPGWM) as input to another model MODPATH /MODPATH-PLOT. i.e., what is the pedigree for a derivative model?	Please explain and clarify.	Technical basis and completeness.				
	P.B-4, L: 14	The most recent model package report is CP-47631 Rev 2, 2014. Correct this or clarify why the 2011 reference is cited.	Correct this, or clarify why the 2011 reference is cited.	Completeness.				
	P.B-5, L: 25	Put a colon after the year 2012.		Accuracy.				

Review Comment Record

Washington State Department of Ecology, Nuclear Waste Program

Date: October 12, 2016

Page 10 of 11

Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.B-5, L: 25 and Table 3-1	The time periods do not match. The text provides a date of 2012, while the table states 2011. Chapter 5 of SGW-59564 states 2009 through 2010. Unclear what duration of calibration period for interim P&T remedy. Please rectify for consistency in SGW 59564 and this appendix.	If the range is 4 years of data, then the steps in the table are correct. If it is 5 years of data, then it should be 60 stress periods and end in 2012.	Technical basis and completeness.				
	P.B-6, L: 10	Replace the word 'or' with the word 'and' to read "current monitoring well locations for Trenches 31 and 34, and to determine if adjustment..." One action doesn't preclude the other.	Correct the text for completeness and accuracy.	Completeness.				
	P.B-6, L: 9-11	The bullet indicates scenarios were selected "to determine if adjustment to the monitoring network is needed." I cannot see where this evaluation is performed. Add a section that addresses these requirements of letter 15-NWP-157, as indicated on P. 1-1 in the 3 rd bullet of this report.	Add a section to address these requirements of letter 15-NWP-157, as indicated on P. 1-1 in the 3 rd bullet.	letter 15-NWP-157				
	P.B-6, L: 14-20, and P. B-11, L: 15-16 and 25-28	The report indicates two changes made to CPGWM inputs, updating well flow rates and the external (lateral) boundary conditions. They are to be described in Sec. 4.2, but transport, not boundary conditions are discussed.	Please correct the information as necessary.	Technical basis and completeness.				
	P.B-7, Figure 3-1	Provide why these wells cover all 200 West Area and not near the area of interest or 200-ZP-1. Provide validation data, if they are available, in wells near Trenches 31 and 34, since this is the specific region of interest.	Provide validation information for wells near the Trenches.	Technical basis and completeness.				
	P.B-8, L: 9-11	The bases for the scenario weight states, "input from project scientists." This seems an invalid basis. Under sub scenario E, pathlines cross the south edge of the Trenches. This may occur if 299-W15-226 is off for an extended time (well failure, other), but it is given just 5 percent weight. Therefore, the detectability map does not indicate any case where a southward migration pathway occurs. The weight percent assigned to sub scenarios B and D are not consistent, but it seems they should be. Please discuss.	Provide the bases and discussion for the weights assigned! Discuss why the weight percent assigned to sub scenarios B and D are not consistent.	Technical basis and completeness.				
	P.B-8, Table 3-2	Add 100% for Scenario 3 to be consistent with Figure 4-1.		Consistency with Figure 4-1.				
	P.B-8, Table 3-2	Row for scenario 2F has a typo in the well number under the description. Correct W15-35 to W10-35.	Correct the typo error.					
	P.B-9, L: 15-22	Provide why "Random Walk" was used if it "reads and uses the same dispersion inputs as the Hanford version of the transport simulator MT3DMS." How are transport properties used in the particle tracking? Is there variability in the pathlines based on input to Random Walk?	More explanation is needed why Random Walk was used over the Hanford version of the transport simulator. Discuss the use of Random Walk, how the dispersion is (or isn't) incorporated into this tool, how this affects the path line results, etc.	Technical basis and completeness.				
	P.B-10, L: 1-13	These terms were not used in Chapter 6 of SGW-59564. The numerous terms being used for both injection well dilution and source release phenomena is thus confusing.	Be consistent throughout this document and use distinct but consistent terminology.	Accuracy and completeness.				
	B-10, in 36-37, B-11, in 1-2	Has this assumption been validated by comparing actual dispersion in a plume with simulated dispersion?	Please address.	Technical basis and completeness.				

Review Comment Record		Washington State Department of Ecology, Nuclear Waste Program				Date: October 12, 2016		
						Page 11 of 11		
Item No.	Page; Section; Line; Paragraph; Sentence	Comment or Question	Modification Needed	Basis/Justification	Response	Ecology Response	Status	Reviewer Initials
	P.B-17, Table 4-3	One reference identified is PNNL-18564, but I don't see that in the table. Remove it or identify why it is included.	Correct the reference.	Accuracy.				
	P.B-20, Lines 35, 36	The locations of grid cells in relation to the Trenches is unclear. Provide a graphic of the CPGWM cells and the calculation sub grid cells. Does the scale of the sub grid cells provide adequate resolution and discretization?	Provide a graphic of the CPGWM cells and the calculation sub grid cells.	Technical basis and completeness.				
	P.B-21, Sec. 6.1, L: 9	Provide in more detail why this parameter (weight probability) was used for these simulations, but not for other analyses such as dilution and breakthrough curve simulations. Justify this.	See comment.	Technical basis and completeness.				
	P.B-22, L: 30-32	A comment made earlier directly applies here. Release concentration breakthrough curves for proposed wells and wells at the point of compliance are not provided, therefore there is no basis to evaluate the relative effectiveness of the identified wells relative to other possible locations.	Provide release concentration breakthrough curves for the proposed wells and wells at the point of compliance.	Technical basis and completeness.				
	P.B-32, L: 3	A reference to Appendix C is provided, but there is not an Appendix C in this report.	Remove references to Appendix C here and elsewhere.	Accuracy.				
	P.B-35, Figure 7-17	Figure is the same as Figure 7-16.	Please change to the correct figure, for well 299-W10-29.	Wrong figure is provided.				
	P.B-44-B-46, Sec. B-8	Numerous documents are not available for review. When the draft permit is submitted for public comment, we explain in the fact sheet the basis for the permit. Information supporting the Permit basis must be included in the Ecology administrative record and made available for public comment. Merely referencing a document that provides part of the Permit basis is not acceptable, as the public may not have access to the document.	Please provide the numerous modeling documents that are not available for review.	WAC 173-303-840(2)(e)				