**Department of Energy**
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

18-AMRP-0106

MAY 2 4 2018

Ms. Alexandra K. Smith, Program Manager
Nuclear Waste Program
Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Ms. Smith:

RESPONSE TO NOTICE OF DEFICIENCY FOR THE PLUTONIUM URANIUM EXTRACTION (PUREX) STORAGE TUNNELS, OPERATING UNIT GROUP 2 CLASS THREE PERMIT MODIFICATION REQUEST

In reference to the Washington State Department of Ecology's letter (18-NWP-065-Reissue) dated April 20, 2018, this transmittal contains responses to the comments in the Notice of Deficiency for the PUREX Storage Tunnels, Class 3 Permit Modification Request. Included are the Certification for the modified application material (Attachment 1), the response to comments (Attachment 2), and the modified application material REG-0886, Revision 1 and REG-0887, Revision 1 (Attachment 3). The Permittees worked closely with your staff during the development of the response to comments and the modified application material.

If you have any questions, please contact me or your staff may contact Joe Franco, Assistant Manager for the River and Plateau, on (509) 373-9971.

Sincerely,

Doug S. Shoop
Manager

AMRP:DBC

Attachments (3)

cc: See page 2

cc w/attachs:
D. B. Bartus, EPA
J. Bell, NPT
R. Buck, Wanapum
L. J. Cusack, CHPRC
S. L. Dahl-Crumpler, Ecology
D. R. Einan, EPA
M. N. Jaraysi, CHPRC
M. Johnson, CTUIR
R. Longoria, YN
K. Niles, ODOE
D. Rowland, YN
S. N. Schleif, Ecology
D. G. Singleton, CHPRC
B. L. Weese, Ecology
Administrative Record, (TSD: S-2-1)
Ecology NWP Library (Hardcopy)
Environmental Portal
HF Operating Record (J. K. Perry, MSA, A3-01)

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**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Formal Class 3 Permit Modification: PUREX Tunnels
Chapter 1.0- Part A

| Document Manager | | Project Manager | | Facility Site ID | Cleanup Site ID |
|---|---|---|---|---|---|
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| 1 | General | Some of the changes made to the Part A include changes that were agreed upon during the permit renewal Revision 9 workshops. For consistency, Ecology would like to address all of the Revision 9 Part A deficiencies as part of this modification. Ecology will work with you to ensure the remainder of the deficiencies get addressed.<br>The deficiencies which are Part of the Revision 9 process are denoted in the justification column with the following text. "Revision 9 deficiency". | See Comment | | Agreed. Related comments below are incorporated as stated in the response. | | | |
| 2 | Chapter 1, Section VIII.A | Revise the name to "U.S. Department of Energy Owner/Operator". | See Comment | Revision 9 deficiency | Chapter 1, Section VIII.A was revised to read: U.S. Department of Energy, Owner/Operator. | | | |
| 3 | Chapter 1, Section IX.A | Revise the NAICS code to include the last number: 562211. Revise code 541712 to the updated number for R&D in physical, engineering and life sciences, 541715. | See Comment | Revision 9 deficiency | NAICS code 541712 was revised to read: "541715" | | | |
| 4 | Chapter 1, Section X.C | Revise the description to state: "Title V Air Operating Permit (AOP). Incorporation of current non-radiological Notice of Construction permits and FF-01 radiological licenses into the AOP may be delayed up to 2 years." | See Comment | | Chapter 1, Section X.C will be revised to read: Title V Air Operating Permit (AOP). "Incorporation of current non-radiological Notice of Construction permits and FF-01 radiological licenses into the AOP may be delayed up to 2 years." | | | |
| 5 | Chapter 1, Section XI | Because the tunnels will no longer accept waste, this proposed permit modification will add the PUREX Storage Tunnels as a closing unit to the Hanford Facility RCRA Permit, Revision 8c. | Update all chapters/addenda to state the PUREX Storage Tunnels will be added as a closing unit (CUG 19) to the Hanford Facility RCRA Permit, Revision 8c. | | All chapters/addenda were revised to state that the PUREX Storage Tunnels will be added as a closing unit (CUG) 19. | | | |
| 6 | Chapter 1, Section XIV | Waste Codes D009 (elemental mercury) and code D001 (ignitable for the silver nitrate) listed in section XIV stated "included with above" however the first line listed "Includes Debris". Based on information in the WAP these two waste codes are liquid and do not contain debris. | Revise the Part A Section XIV to clarify if needed whether D001 and D009 include debris. | Consistency with text in the WAP. | Chapter 1 Section XIV was revised to remove "Included with above" from D009 (Mercury).<br><br>D001 (silver nitrate) is a contaminant residue on the equipment/debris contained within silver reactors in Tunnel 2 (section 3.5.1.3). There is no indication that it is in liquid form. | | | |

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| 7 | Chapter 1, Section XIV | There is no information in the WAP or Process Information to support the estimated annual quantity of waste numbers in Section XIV., Column B. | Revise the WAP to include information on the estimated amount of waste that will be handled annually for the PUREX Storage Tunnels. The updated WAP information needs to support the estimated quantity of waste numbers in Section XIV., Column B. of the Part A. | | The values have been asterisked and a comment has been added to the Comments page that reads, "*The values for estimated annual quantity represent the maximum quantity of waste placed in the tunnels in a year. The tunnels no longer receive waste."<br><br>The WAP Section 3.3.1 states, "No new waste will be added to the tunnels." | | | |
| 8 | Chapter 1, Section XV Topographic Map | The scale of the topographic map needs to be 1 inch equal to not more than 200 feet. | Adjust the figure scale to 1 inch equal to not more than 200 feet. | WAC 173-303-803(3)(l)<br>Revision 9 deficiency | A hard copy at 1"=200' scale will be provided. | | | |
| 9 | Chapter 1, Section X | Once the evaluation of the need for other environmental permits is complete, this section may need to be updated. | Update this section as new information is acquired regarding the grouting of Tunnel 2. | WAC 173-303-803<br>Revision 9 deficiency | The need for additional environmental permits will not be identified until the grout vendor is identified. Section X will be revised to include any other environmental permits as soon as that information is available. Potential permits may include an air emissions permit for a batch plant or coverage under the existing discharge permit (ST-4511). Note that it is likely that the batch plant will be operated under the Washington State Department of Ecology General Order that is in the process of being administratively incorporated into the AOP so no change is expected to be required. | | | |
| 10 | Chapter 1, Section XVII | The Part A should contain photographs that clearly delineate all existing structures for the PUREX Storage Tunnels. The photographs should at least contain the month and the year taken. | Update Section XVII to include photographs of the PUREX Storage Tunnels that include at least the month and the year taken. | WAC 173-303-803(3)(h)(ii)<br>Revision 9 deficiency | A current aerial photo that shows month and year taken and direction was inserted to replace the existing photo. | | | |
| 11 | Chapter 1 Section XVI | A small drawing is included, however it does not meet the requirements for the facility drawing. | Include a general schematic drawing of the unit group showing the general layout. Approximate dimensions of the unit group boundary also needs to be included. It needs to be approximately to scale and fit on 8½ x11 or an 11x17 paper. | WAC 173-303-803(3)(h)<br>Revision 9 deficiency | A schematic drawing of the unit group was added. | | | |

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**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Formal Class 3 Permit Modification: PUREX Tunnels
Chapter 3.0- Waste Analysis Plan

| Document Manager | | Project Manager | | Facility Site ID | | Cleanup Site ID |
|---|---|---|---|---|---|---|
| Brigitte Weese | (509) 372-7936 | Stephanie Schleif | (509) 372-7929 | CUG – 25, WA7890008967 | | |

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| 1 | Chapter 3, Section 3.3 Facility Description, Pg. 3.9, Lines 39-42 | Update this section to state that the water-fillable doors for both Tunnel 1 and 2 will not be filled with water in the future. | See Comment | | Page 3-8, line 37 and 3-9, line 12 were revised to explain that the door to Tunnel #1 will not be refilled. Page 3-9, line 34 already makes that statement about Tunnel #2. | | | |
| 2 | Chapter 3, Section 3.8.2 Provisions for Complying with Land Disposal Restriction Requirements, Pg. 3.19 | Although a final closure decision has not been made, grouting of the tunnels is not reversible and thus there is a need to consider Land Disposal Restriction Requirements under WAC 171-303-140(2). Under 40 CFR 268 hazardous debris may be microencapsulated to meet LDR. However; for waste that is not debris, the appropriate LDR treatment standard needs to be considered. If the LDR treatment standard for certain waste types cannot be met, a variance to the treatment standard needs to be submitted in accordance with 40 CFR 268.44.<br><br>In reviewing the WAP, the waste codes which require treatment other than macroencapsulation are those in PUREX Storage Tunnel 2 which includes elemental mercury (D009) and silver nitrate (D001). In addition, any debris which will not be directly macroencapsulated by grout will need a variance to meet the treatment standards. Intact tanks also do not meet the definition of debris. | The Permittee needs to consider the LDR treatment standard for each type of waste present in both tunnels 1 and 2. If the treatment standard cannot be met a site-specific treatability variance needs to be submitted in accordance with 40 CFR Part 268.44 as incorporated by reference under WAC 173-303-1430(2). | 40 CFR 268.44<br><br>WAC 173-303-140<br><br>WAC 173-303-140(2)(a)<br><br>40 CFR 268.44(h) | The section was revised to read: "Grouting macroencapsulates the waste which is an accepted treatment for hazardous debris under 40 CFR 268.45. When determining the final closure decisions, the appropriate LDR treatment standards for waste that is not debris will be considered. If the appropriate LDR treatment standard cannot be achieved due to physical limitations or if treatment is otherwise inappropriate, a petition for variance from the treatment standard will be submitted in accordance with 40 CFR 268.44."<br><br>Note: Table 3.1 was not revised as discussed in the 5-16-2018 meeting because at this time we can't ensure that the waste can be defined as hazardous debris due to the potential for intact tanks and containers. | | | |
| 3 | Chapter 3.0, Pg. 3.20, Table 3.1, Line 15 | "The tracks have a one percent downgrade toward the south end of the tunnel."<br><br>Section 3.3 (Pg. 3.1) states the following:<br>"The tracks are on a 1/10 of 1 percent downgrade slope to the south to ensure the railcars remain in their storage position"<br><br>These two statements are contradicting. | Clarify which statement is correct and make the appropriate clarification to the text. | | Chapter 3.0, Pg. 3.20, Table 3.1, Line 14 was revised to read: "The tracks have a 0.1 percent downgrade toward the south end of the tunnel." | | | |

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| 4 | Chapter 3.0, Pg. 3.22, Table 3.1 | Revise position number 22 to the correct date of placement. The tunnels could not have accepted the waste in 2006. The railcars that were stored in the tunnel before and after the railcar in question were both placed in 1996. | See Comment. | | The text was revised to read: "Placed in Tunnel on 3-11-96, on Car #3616."<br><br>Note that several other changes were made in Table 3.1 to correct errors or omissions that were identified during the investigation process and during development of additional characterization information. | | | |

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**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Draft Class 3 Permit Modification: PUREX Tunnels
Chapter 4.0- Process Information & Appendix 4C- Technical Information on Grouting PUREX Storage Tunnels

| Document Manager | | | | Project Manager | | | Facility Site ID | | | Cleanup Site ID |
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| 1 | Chapter 4, Process Information | Chapter 4 (Process Information), the Part A, and Chapter 3 (Waste Analysis Plan) needs to clearly state that the PUREX Storage Tunnels are going to closure and will no longer accept waste. | Update the following:<br>1. Sections 4.1.2.1 (lines 25-26), 4.1.2.2 (lines 32-33), 4.1.2.4, 4.1.3, 4.2.1 and 4.2.2 need to be updated to coincide with this clarification.<br>2. Part A, Nature of Business (Section XIV)<br>3. Chapter 3 (Waste Analysis Plan), Section 3.0 | | Chapter 4, the Part A, and the Waste Analysis Plan were revised to reflect the appropriate language. | Agree | Close | |
| 2 | Chapter 4, Process Information | The process section should contain more information on the types and amounts of the dangerous waste contained within each tunnel. The amount of each waste should be in line with information contained in the Part A. | This should include the contents that are found in each tunnel, description of the contents, waste description, and applicable waste codes. | | Section 4.2 was revised to add a description of the tunnel contents and a reference to further information in the Waste Analysis Plan. | Agree | Close | |
| 3 | Chapter 4, Process Information | As the lead regulatory agency for 200-CP-1, Ecology would like a list of all suspect TRU(M) waste in both Tunnels 1 and 2. This information is needed to understand further what the future pathway for this waste might entail. | Provide a list of all suspect TRU(M) waste in both Tunnels 1 and 2 to Ecology. | 40 CFR 302.4 as promulgated pursuant to 42 U.S.C.A. § 9602 | DOE will work with Ecology to provide information about suspect TRUM in the tunnel. DOE does not plan to include this information in the permit. | Provide to Ecology information about suspect TRU(M) in the Tunnel 1 and 2.<br><br>The characterization document provided with this RCR identifies the gram content of transuranic elements in each of the rail cars for tunnels 1 and 2. | Open | |
| 4 | Chapter 4, Process Information | Include the maximum amount of waste that could be present in the unit at any time. Because the PUREX Storage Tunnels are closing, this would be the maximum amount of waste it received/processed while operational. | See comment | | Section 4.2 was revised to include amount of waste received. | Agree | Close | |

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| 5 | Chapter 4, Pg. 4.5 | In the general background section of the Process Information Chapter, it is prudent to put the information from Section 4.3 here. Then, the rest of the chapter will make sense when there are references to grouting. Obviously the tunnels are going from an operating facility to a closing facility, so there needs to be context of the type of current status of the PUREX Tunnels and the waste management activities occurring in that DWMU. | See comment | | Chapter 4 was revised to include discussion of grouting in the introduction. | Agree | Close | |
| 6 | Chapter 4, Section 4.1, Pg. 4.5, lines 17-19 | Ecology does not agree with the statement on lines 17-19. Sections 4.1.1, 4.1.2 and 4.1.3 should describe the activities for selection, characterization, preparation, placement and removal activities associated with storage of mixed waste. If these activities are impacted by grouting, they need to be updated to describe how they will be accomplished after grouting is complete. | Update Section 4.1.1, 4.1.2, and 4.1.3 to detail how selection, characterization, preparation, placement and removal activities for the waste in both Tunnels will be accomplished post grouting and revise the statement on lines 17-19 in Section 4.1. | WAC 173-303-680(2) | Section 4.1 was revised to describe the very limited operations associated with the tunnels. The subsections have been deleted because no further selection, characterization, preparation, placement and removal activities will be performed in the tunnels. | Sections 4.1.2 and 4.1.3 relating to how the waste was characterized and placed in the tunnel is still needed should a decision be made in final closure to retrieve these railcars. Instead of deleting, revise these sections to make this historical information instead of if the tunnel is reopened to accept additional waste.<br><br>A new Section 4.1.1 was added to briefly summarize the information previously contained in Sections 4.1.2 and 4.1.3. | Open | |

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| 7 | Chapter 4, Section 4.1.1 and 4.1.1.1 and 4.1.1.3, Pg. 4.5 | Under the current configuration of the tunnels, will material continue to be removed and transported to the PUREX Tunnels for storage? Is this a current state of the tunnels? With the grouting of the tunnels, this should be removed since no new materials will be entering the tunnel.<br><br>If these portions were to be re-written to state this was the process for preparation, storage and removal of material, then that is appropriate and aligns with other Sections of the chapter. | See comment | | Section 4.1 was revised to describe the very limited operations associated with the tunnels. The subsections have been deleted because no further selection, characterization, preparation, placement and removal activities will be performed in the tunnels. | Agree | Close | |
| 8 | Chapter 4, Section 4.1.6, Pg. 4.8, lines 12-14 | Ecology does not agree with the statement on lines 12-14. Section 4.1.6.1 and 4.1.6.2 should be updated to reflect how they will be impacted post grouting instead of marked not applicable. | Update Sections 4.1.6.1 and 4.1.6.2 to detail how the operation of ventilation will be impacted post grouting and update the sentence on lines 12-14. | | Section 4.1 was revised to describe the very limited operations associated with the tunnels. The subsections, including the subsections on operation of the ventilation system, have been deleted. | Agree | Close | |
| 9 | Chapter 4, Section 4.2.1, Pg. 4.9, Lines 16-18 | "The 304L stainless steel used to contain the elemental mercury is both compatible with the waste itself and the storage environment. The potential for significant deterioration of either the primary or secondary containment barrier before closure is considered to be negligible."<br>This statement was made under different assumptions when the PUREX Storage Tunnels would undergo closure. It needs to be updated to account for current closure decisions. | What is the potential for significant deterioration of either the primary or secondary containment barrier after grouting is completed and while the PUREX Storage Tunnels are awaiting final closure? If the retrieval/clean closure option is chosen for final closure activities, how would the mercury waste be impacted if the location of the cut goes through a dissolver, subsequently exposing mercury to the environment? Please include this evaluation as part of the Process Information. | | This paragraph was revised to indicate that no interaction between the stainless steel and surrounding grout is expected. The potential for significant deterioration of the barriers between mercury and the environment is still considered to be negligible.<br><br>The closure addendum was revised to include a statement that the remedial design will have to ensure that mercury is not released to the environment during cutting/removal if clean closure is selected | Agree | Close | |
| 10 | Chapter 4, Section 4.2.4, Pg. 4.10 | This section needs to be updated to describe the impacts of grouting on the ignitable waste. | Update this section to include the grouting impacts on the ignitable waste. | | No impacts from grouting are expected because the silver nitrate is contained within stainless steel vessels as described in Section 4.2.4, lines 16-17. This section was revised to clarify. | Agree | Close | |
| 11 | Chapter 4, Section 4.3, Pg. 4.10, Lines 38-41 | The PUREX Tunnels Contingency plan needs to be updated as a non-OUO document. | See comment | | The contingency plan was revised. | Agree | Close | |
| 12 | Chapter 4, Section 4.3, Pg. 4.10, Lines 43-45 | Ecology has not agreed to this statement. This statement is in contradiction to language that is in the Amended Order #15419 which requires USDOE-RL to "Update the Closure Addendum to include any interim actions needed for safe storage of waste in PUREX Storage Tunnel 1 and Tunnel 2". In addition, WAC 173-303-610(3)(a)(vi), requires a detailed description of other activities necessary during the closure period to ensure that all partial closure and final closure satisfy closure performance standards. | This paragraph needs to be edited to show that the stabilization of Tunnel 2 is an interim closure activity that is the same as what was done at WESF when Hot Cells A-F were grouted. | Administrative Order, Docket Number 15419, Corrective Action 3, WAC 173-303-610(3)(a)(vi) | Section 4.3 was revised to describe interim closure. | Agree | Close | |

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| 13 | Chapter 4, Section 4.3, Pg. 4.11, Line 5 | "Inspections will be conducted annually as described in Addendum I (Inspection Requirements)." Addendum I will need to be updated to show the Inspection Requirements during grouting activities and also the inspection requirements after grouting activities are completed. While the periodicity for this inspection requirement might make sense for Tunnel 1 since it has already been grouted, the inspection of Tunnel 2 needs to happen more frequently and this should match the inspection frequency described in the deliverable for Corrective Action 2 of the Administrative Order and recent emails from DOE detailing both the means and frequency of inspections. (Email sent from DOE to Ecology on 12/22/17). | This sentence should be revised to reflect current practices for surveillance of both Tunnel 1 and 2. This should also be updated in the inspection plan. | WAC 173-303-320 | The section discusses the daily observations being conducted at Tunnel 2 until grouting is completed.<br><br>The Inspection Plan was revised to address the inspections to be performed on Tunnels 1 and 2. | Agree | Close | |
| 14 | Chapter 4, Section 4.3, Pg. 4.11, lines 6-7 | "Anomalous conditions and changes from previous observations will be evaluated to determine if further action is necessary." It is not clear what this sentence is stating. Any changes to inspections will need to be documented through the permit. | Revise this statement to clarify what is being referred to as "Anomalous conditions and changes…" and how further action will be coordinated with changes to the permit. | | This statement will be revised to clarify. Detection of anomalous conditions (meaning discovery of changes to the exterior conditions of the tunnel that may be the result of structural issues) would not by themselves require a change in the permit, but may require activation of the contingency plan.<br><br>If it is determined that further actions are necessary as a result of the anomalous condition that affect the descriptions, conditions, or processes contained in the permit, a modification will be processed as appropriate. | Rewrite the last sentence to state, "If it is determined that further actions are necessary as a result of the anomalous condition that affect the descriptions, conditions, or processes contained in the permit, a permit modification will be submitted in accordance with WAC 173-303-830.<br><br>The sentence was revised as suggested. | Open | |
| 15 | Appendix 4C | The information included in Appendix 4C is key to a more enforceable, accurate, and current Chapter 4. | Incorporate Appendix 4C into Chapter 4 instead of separating this information out into a separate document. | | The information in Appendix 4C was moved to the Closure Addendum. | Agree | Close | |

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| 16 | Appendix 4C | Insert sections related to the closure activities for both Tunnels 1 and 2 and clearly label the sections of the closure plan as they pertain to each tunnel. These sections can be similar to those that are found in the WESF Closure Plan and may include:<br>1) Health and Safety Requirements as they apply for both pre and post grouting activities (This should also specify how worker exposure to dangerous waste and any other work place hazard from grouting activities will be minimized or eliminated).<br>2) Records review and visual inspections (this should specify that records were reviewed in order to develop the closure of the storage tunnels).<br>3) Site Preparation<br>4) Unit modification prior to stabilization via grout<br>5) Stabilization (which would include grout design, grout delivery, grout placement, ventilation, control of contamination during grouting, piping systems, work platform, etc.)<br>6) Technical details related Closure activities(demolition activities, removal of waste and waste residues, removal of units, parts, equipment, piping, containment structure, and other ancillary equipment, the identification and management of waste generated during closure, unit inspection prior to decontamination, decontamination, identification and management of contaminated environmental media, confirmation of clean closure if chosen, constituents to be analyzed, a sampling and analysis plan, and the role of the Independent Qualified Registered Professional Engineer) | If the closure activities will be conducted in conjunction with a future Past-Practice document, then state this and the operable unit that will contain this information. | WAC 173-303-335<br><br>WAC 173-303-610(3)(a)(v), 173-303-806(4)(a)(xiii) | The information in Appendix 4C was moved to the closure addendum and was revised to incorporate this type of information, except for some of the information requested in item 6. Most of those steps relate to final closure details which are not available for the tunnels. Sections on management of contaminated environmental media and the role of the Independent Qualified Registered Professional Engineer were added to the final closure section. | Agree | Close | |

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| 17 | Appendix 4C-1, Pg. 4C.1 | No information is provided on the expected curing time of the engineered grout. | Provide information on the expected curing time of the engineered grout when placed in the tunnels. | | An explanation of curing time needed between lifts was added to closure addendum, Section 11.5.5.4.1. | The Appendix states in Section 11.5.5.4.1 "…tests were conducted to determine when the compressive strength of a grout lift was sufficient to allow the next lift to be poured." However, Ecology needs to know the ultimate curing time to reach a strength that is suitable for Clean Closure as proposed in Section 11.4.1 as an alternative.<br><br>Sections 11.4.1 and 11.5.5.4.1 were revised to indicate that the grout will achieve its target minimum compressive strength in 28 days and that the grout will have sufficient strength to provide structural support to the tunnel and to be cut using technologies that would be applied if clean closure was selected. | Open | |

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| 18 | Appendix 4C-1, Pg. 4C.1 | No information was given on what happens to trucks when the grout does not meet established standards. | Provide info on what happens to trucks when the grout does not pass established QA/QC standards. | | An explanation that grout not meeting standards is rejected and not used was added to closure addendum, Section 11.5.6.4.3. | The Appendix states in Section 11.5.6.4.3. (last sentence) "Grout trucks that do not meet standards will be returned to the vendor and will not be used for the tunnel." Rewrite the sentence to state: 'grout that does not meet the grout design standards listed in Section 11.5.5.4.1 will be returned to vendor and will not be used for the tunnel.'<br><br>Section 11.5.6.4.3 was revised as suggested. | Open | |

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| 19 | Appendix 4C-1.1, Pg. 4C.2, Lines 16-17 | The report states that "Based on a review of the grouting design and PUREX Tunnel Number 1, there is no concern that there will be degradation of grout due to radiation exposure". | Ecology finds this statement to be overreaching as the Tunnel 1 has just completed stabilization efforts. Ecology believes there is cause for concern of degradation due to radiation exposure; especially as there currently is no schedule or plan in place for the ultimate disposition of waste. Provide a schedule and options considered for ultimate disposition of the waste for Tunnel 1 & 2. This information may also be provided as part of the closure plan. | | Closure addendum Section 11.5.5.4.2 was revised to clarify that there is no concern about degradation in the near term. A new section on closure schedule (11.7) was added to the closure addendum. | The application states in Section 11.5.5.4.2 that the expected timeframe to reach the concrete degradation threshold is from 110 to 590 years. However, in Section 11.7 it states that "Final Closure activities for the PUREX Storage Tunnels will take place in conjunction with the remedial actions for the PUREX Plant and the 200-CP-1 Operable Unit. It is anticipated that a number of years will elapse before remedial actions for the PUREX Plant can be initiated."<br>The 'number of years' to implement the remedial actions for final closure should be less than the stated concrete degradation threshold from radiation so that it not may not limit any activities for Clean Closure as proposed in Section 11.4.1 as an alternative. | Close | |

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| 20 | Appendix 4C-2.3, Pg. 4C.3 | This paragraph on ventilation should include more details concerning HEPA filters, as the ventilation is an essential part to completing the interim closure decision to grout both tunnels. How long are the HEPA filters predicted to last and what are the procedures for HEPA filter disposal and/or replacement? | This information could be included as a reference to the WA Department of Health licenses. | | A reference to the WDOH license was added to Closure addendum Section 11.5.5.3.3. | The referenced NOC ID and EU ID are only applicable for Tunnel 1. Please reference the AOP which will cover both Tunnels 1 and 2.<br><br>Section 11.5.5.3.3 cites the correct license number for Tunnel 1; the sentence has been revised to clarify that this license is for Tunnel 1.<br><br>Text in Section 11.5.6.3 for Tunnel 2 has been revised to read "The system will be designed and licensed in accordance with the Hanford Site Air Operating Permit (AOP 00-05-006)." | Open | |

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| 21 | Appendix 4C-5, Pg. 4C.4, Lines 21-22 | "Grouting design and placement for PUREX Storage Tunnel Number 2 will include lessons learned from design and operation for Tunnel Number 1."<br>There is no design information on how grouting of Tunnel 2 will be performed. This design information is a requirement for the interim closure activity of grouting. | See comment | | A new section 11.5.6 was added describing the interim closure of Tunnel 2. It is currently a work in progress as the design is still evolving. Additional information will be provided as it is available. | Ecology needs to see this design. What is the timeline for submittal of this document?<br><br>Text and figures in Chapter 11 have been revised to reflect current design information. A supplemental package will be submitted along with the revised permit containing the 90% design drawings. | Open | |
| 22 | Appendix 4C-5, Pg. 4C.4, Lines 21-22 | No interim schedule or schedule for final disposition of waste in Tunnel 2 was provided. Risk of failure still exists for Tunnel 2 and the stabilization schedule and efforts should reflect this risk. | Provide a schedule for interim stabilization efforts for Tunnel 2 that coincide with the outstanding risk of Tunnel 2 collapse. Provide justification for schedule for future stabilization efforts for Tunnel 2. This can be provided as part of the closure plan. | | A schedule section (11.7) was added to closure addendum. | Agree | Close | |
| 23 | Appendix 4C-5, Pg. 4C.4, Lines 21-22 | Provide background on why grouting was chosen as the stabilization method of choice for Tunnel 2. | Provide a brief explanation on why grouting was chosen as the stabilization method of choice for Tunnel 2. | | A new section 11.5.6 was added describing the interim closure of Tunnel 2. | Agree | Close | |
| 24 | Figures 4C-2, 4C-3, 4C-4, 4C-5, 4C-6 | Figures 4C-2 through 4C-6 titles need to be clarified that they pertain to Tunnel #1. Other figures will need to be added for Tunnel #2. | See comment | | Tunnel 1 was added to the figure titles. | Agree | Close | |
| 25 | PCN Form | The permittees need to submit a Class 3 modification PCN form that outlines all the changes made to the Process Information, Preparedness and Prevention, and Closure Chapters. | See Comment | | The appropriate documentation for the permit modification will be submitted. | Agree | Close | |
| Class 3 Permit Modification: Formal Submittal Comments | | | | | | | | |

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| 26 | Chapter 4, Section 4.4 Engineering Drawings, Pg. 4.12-4.13 | As-built drawings for the PUREX Storage Tunnels were added, deleted, and modified. | Provide the drawings contained in the table to Ecology as supplemental information. Provide justification for the deletion of the engineered drawings contained in the table. | | | The deleted drawings have been restored to the table. Changes to drawing titles were made where needed to reflect the correct title of the drawing or sheet. Drawings for equipment that is no longer functional have been identified. | | |

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**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Draft Class 3 Permit Modification: PUREX Tunnels
Chapter 11: Closure and Financial Assurance

| Document Manager | | Project Manager | | Facility Site ID | Cleanup Site ID |
|---|---|---|---|---|---|
| Brigitte Weese | (509) 372-7936 | Stephanie Schleif | (509) 372-7929 | CUG – 25, WA7890008967 | |

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| 1 | Chapter 11 Closure and Financial Assurance | Include time frames and schedules for both the interim closure activities of grouting and final closure of the PUREX Storage Tunnel in accordance with 200-CP-1 Unit Group. This schedule may refer to TPA milestones associated with the remedial decision for 200-CP-1. | This should contain a schedule for closure of each DWMU to include the start of closure, interim closure activities, and applicable milestones for 200-CP-1. The section on time frames and schedules could be similar to Section H6 of the WESF Hot Cells A-F Closure Plan. This should include submitting to Ecology the interim closure report after grouting is complete. | WAC 173-303-610(3)(a)(vii), 173-303-610(3)(c)(ii), 173-303-610(4)(a)-(c), 173-303-806(4)(a)(xiii) | A new section 11.7 Closure Schedule and Time Frame has been added. | "Grouting may be done in two periods because of weather constraints." The specifics for the two periods of grouting need to be described in the permit. The use of the word "may" is not acceptable in the permit.<br><br>We are not planning to use two periods for grouting; this sentence has been deleted.<br><br>Table 11-3 should include TPA milestone (including dates) to explain the extended closure period.<br><br>A line citing M-085-80, Submit RI/FS Work Plan for 200-CP-1, due 9-30-2020 has been added to the table. | Open | |

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| 2 | Chapter 11 Closure and Financial Assurance | The closure plan needs to include a detailed map (with a scale of no more than 1 inch= 200 feet) or diagram of the unit group, with each DWMU and groundwater monitoring wells clearly located and identified, and include a legend and north arrow. | Update Addendum A, Part A or the Closure Plan to reflect this requirement. | WAC 173-303-610(3)(a)(ii), WAC 173-303-806(4)(a)(xiii) | The topo map in the Part A has been updated. | Agree | Close | |
| 3 | Chapter 11 Closure and Financial Assurance | Include Information related to the cost of Closure of the PUREX Storage Tunnels. | The section on cost of Closure could be similar to Section H7 of the WESF Hot Cells A-F Closure Plan. | | A new section 11.8 Cost of Closure has been added using the same language as the WESF closure plan. | Agree | Close | |
| 4 | Chapter 11, Section 11.0, Pg. 11.5, Lines 15-16 | "The PUREX Storage Tunnels are permitted and managed as a RCRA miscellaneous unit."<br>It should be clarified here that both of the Tunnels are going to closure and will not accept waste. | See Comment. | | Clarification was added to the introductory paragraphs. | Agree | Close | |
| 5 | Chapter 11, Section 11.0, Pg. 11.5 | Add a general statement on the closure performance standards and that closure will either meet these standards or go into post-closure care and a post-closure plan will be submitted when appropriate. This section should discuss at a high level options for closure. | Include that the closure plan covers initial/interim closure actions for the Tunnels. Final closure of the Tunnels will be completed concurrent with closure activities for the 200-CP-1 operable unit. Closure performance standards for final closure of the PUREX Storage Tunnels will be based on WAC 173-303-610(2)(a)(i)-(iii). | WAC 173-303-610(2)(a)(i)-(iii) | The scope statement was added to the introductory paragraphs. A new Section 11.4 has been added on closure performance standards | Agree | Close | |
| 6 | Chapter 11, Section 11.0, Pg. 11.5 | Describe how the PUREX Storage Tunnels will comply with the requirements of WAC 173-303-680(2)-(4) after grouting. | This can be done with a table similar to Table H2 found in WESF Hot Cells A Through F Closure Plan (Hanford Dangerous Waste Permit Rev 8c). | WAC 173-303-680(2)-(4). | A table similar to Table H2 of the WESF Closure Plan was added to new Section 11.4. | Agree | Close | |
| 7 | Chapter 11, Section 11.0, Pg. 11.5, Lines 16-19 | "In addition, the PUREX Plant and the PUREX Storage Tunnels are to be coordinated with the CERCLA remedial action for the 200-CP-1 Operable Unit because the close proximity of the two facilities will impact the final disposition of each facility."<br>The addition of the PUREX Storage Tunnels to the 200-CP-1 Operable Unit will need to be submitted to Ecology via a TPA change notice. | See comment. | | A TPA change package to incorporate 218-E-15 and 218-E-16 into the 200-CP-1 OU will be submitted to Ecology. | Submit to Ecology a TPA change notice to add the PUREX Storage Tunnels to the 200-CP-1 Operable Unit.<br><br>The TPA Appendix C change package is being developed. | Open | |
| 8 | Section 11.0 Closure and Financial Assurance, Pg. 11.5, Lines 36-40 | This mechanism for coordinating with CERCLA documents has not been decided yet, this is part of the Option 2 template discussion which is currently in final draft. | Revise these lines to state something similar to "DOE will work with Ecology on integrating additional CERLCA decision information as it becomes effective into this closure plan." | | The paragraph was moved to Section 11.6 and revised as suggested. | Agree | Close | |

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| 9 | Chapter 11, Section 11.0, Pg. 11.5, Lines 41-43 | "The PUREX Storage Tunnels closure plan will be written to meet the requirements of WAC 173-303-140 and WAC 173-303-610. This closure plan might consider but will not be limited to the following options for either in situ disposal or retrieval/clean closure of this unit."<br>This section and statement needs to clarify that the grouting of the PUREX Storage Tunnels is an interim closure activity and should describe the phased closure approach that the Tunnels are following (similar to WESF).The closure plan should detail all aspects of grouting or reference that the information is in Chapter 4, Process Information. The final closure decision in accordance with WAC 173-303-610 will be deferred until the development of the CERCLA remedial decisions for 200-CP-1 are established. An overview of the potential options of the final closure decision are contained in Section 11.1 and 11.2. | See Comment. | | The introduction was revised to reflect interim closure. New sections 11.5 has been added describing interim closure activities, including grouting. | The closure plan does not detail all aspects of grouting Tunnel 2. Submit to Ecology supplemental information that describes the aspects of grouting Tunnel 2.<br><br>The closure plan has been revised to incorporate additional information about the Tunnel 2 design. Additional supplemental information (design drawings) will be provided.. | Open | |
| 10 | Chapter 11, Sections 11.1, 11.1.1, Pg. 11.5-11.6 | Specify that the landfill closure option will comply with WAC requirements as applicable, in addition to the RCRA landfill cover requirements. | See Comment. | | Statement was added as suggested. | Agree | Close | |
| 11 | Chapter 11, Section 11.1, Pg. 11.6, Lines 3-4 | "Tunnel Number 2 will also be filled with grout pending completion of design and planning activities." The design and planning activities for grouting Tunnel 2 are subject to DW permitting requirements. | This statement needs to be revised to state, "Tunnel Number 2 will be filled with grout in accordance with this closure plan and the Process Information Addenda/Chapter." | | The landfill closure paragraph was revised to reference interim closure. | Agree to close based on sentence in section 4.2 of Process which states, "Grouting in Tunnel Number 2 will be initiated pending completion of planning, design, and permit modification." | Close | |
| 12 | Chapter 11, Sections 11.2, 11.2.1, 11.2.2, 11.2.3, Pg. 11.6-11.8 | Specify that the Retrieval/Clean Closure Options will comply with the WAC requirements as applicable. | See Comment. | | Statement was added as suggested. | Agree | Close | |

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| 13 | Chapter 11, Section 11.5.5.3.3 Ventilation System, Pg. 11.13, Lines 34-35 | "Passive ventilation was provided during the grouting operation to control contamination in accordance with the Washington Department of Health License (EU 1471 NOC 1262) conditions and limitations." The referenced NOC ID and EU ID are only applicable for Tunnel 1. Please reference the AOP which will cover both Tunnels 1 and 2. This should be edited for the entire permit modification chapters/addenda. | See Comment | | Section 11.5.5.3.3 cites the correct license number for Tunnel 1; the sentence has been revised to clarify that this license is for Tunnel 1.<br><br>Text in Section 11.5.6.3 for Tunnel 2 has been revised to read "The system will be designed and licensed in accordance with the Hanford Site Air Operating Permit (AOP 00-05-006)." | | | |
| 14 | Chapter 11, Section 11.5.5.4.1 Grout Design, Pg. 11.14 | Provide an explanation on how the strength of the grout correlates to its potential removal. Including the use of a diamond saw and its ability to cut the grout and waste if clean closure is the chosen path for Final Closure. | See Comment | | Text has been added to Section 11.5.5.4.1 that reads, "The grout will have sufficient strength to provide structural support for the Tunnel. The formula was developed to also allow it to be cut using a diamond wire saw or other technology if Clean Closure is selected as the final closure action." | | | |
| 15 | Chapter 11, Section 11.5.5.4.4 Grout Placement | Include in Section 11.5.5 the amount of grout that was inserted into Tunnel 1 (in cubic yards) and also include information about the 0-6 inch air gap. | See Comment | | Text has been added to Section 11.5.5.4.4 that reads, "A total of 4,396 cubic yards of grout was placed into Tunnel 1. This totally encapsulated the equipment to within approximately six inches from the roof timbers."<br><br>Text has also been added to Section 11.5.6.4.3 that reads, "It estimated that Tunnel 2 will require approximately 43,000 cubic yards to stabilize." | | | |
| 16 | Chapter 11, Section 11.5.6 Interim Closure of Tunnel Number 2, Pg. 11.16, Lines 14-16. | "The descriptions represent a conceptual design that must be verified; some details may change as the design progresses."<br>The details needed to complete grouting of Tunnel 2 need to be provided prior to the second portion of the Class 3 permit modification. If the details in the permit change, this would require a permit modification. Please clarify. | See Comment | | Section 11.5.6 has been revised to reflect current design information. The sentence cited has been deleted. | | | |
| 17 | Chapter 11, Section 11.5.6.2 Site Preparation, Pg. 11.16, Lines 30-32 | "Additionally, investigative work will be performed to verify the assumptions utilized in the engineering design process. This will include removing a 3- inch plug in an existing tunnel riser to enable samples to be taken in the interior of the tunnel and ensuring the main plug can be removed."<br><br>The proposed permit documents need to be updated and submitted prior to the second portion of the Class 3 to describe the investigative work and the results of the work. | See Comment | | Section 11.5.6.2 and corresponding figures have been revised to include information about the investigation and the results. | | | |

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| 18 | Chapter 11, Section 11.5.6.3 Modifications made Prior to Stabilization, Pg. 11.17, Lines 4-9 | The proposed permit documents need to be updated and submitted prior to the second portion of the Class 3 to describe the design plan. This should include a decision on whether or not a dam is needed/can be achieved and whether a batch plant will be utilized. | See Comment | | The dam is no longer necessary. The paragraph describing the potential dam has been deleted. | | | |
| 19 | Chapter 11, Section 11.7 Closure Schedule and Time Frame, Pg. 11.21, Lines 33-34 | "Preparation for and implementation of interim closure activities are being completed to ensure stabilization of Tunnel Number 2 as soon as possible."<br><br>When will the preparation and implementation of interim closure activities be complete? | The permit modification will need to be updated as this information becomes available. | | The text has been revised to indicate that the stabilization is targeted to start in 2018. | | | |
| 20 | Chapter 11, Figures 11.9 and 11.10 | Provide labels for the components shown in Figure 11.9 (Plug replacement) and also Figure 11.10 (equipment). | See Comment | | The figures have been revised to update to the current design and to include labels. | | | |

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**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Draft Class 3 Permit Modification: PUREX Tunnels
Addendum F: Preparedness and Prevention

| Document Manager | | | Project Manager | | | Facility Site ID | | | Cleanup Site ID |
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| 1 | Addendum F, Section F.1, Pg. F.5, Lines 11-17 | Ecology has not agreed to this statement. This statement is in contradiction to language that is in the Amended Order #15419 which requires USDOE-RL to "Update the Closure Addendum to include any interim actions needed for safe storage of waste in PUREX Storage Tunnel 1 and Tunnel 2". In addition, WAC 173-303-610(3)(a)(vi), requires a detailed description of other activities necessary during the closure period to ensure that all partial closure and final closure satisfy closure performance standards. | This paragraph needs to be edited to show that the stabilization of Tunnel 2 is an interim closure activity that is the same as what was done at WESF when Hot Cells A-F were grouted. | Administrative Order, Docket Number 15419, Corrective Action 3, WAC 173-303-610(3)(a)(vi) | Introduction has been revised to refer to interim closure. | Agree | Close | |
| 2 | Addendum F, Section F.1, Pg. F.5 | There is no information on communication during grouting operations. WAC 173-303-340(2)(a) requires that whenever a dangerous waste is being poured, mixed, spread or otherwise handled (e.g. grouted), all personnel involved need to have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another employee. | Provide information on how communication will be conducted between personnel during grouting of Tunnel 2. | WAC 173-303-340(2)(a) | The existing information in the section applies during any activity conducted at the tunnels, including grouting. Section F.1.1.2 was revised to clarify. | Agree | Close | |
| 3 | Addendum F, Section F.1, Pg. F.5, Line 23 | "Inspections will be documented annually as described in Addendum I (Inspections Requirements)." While the periodicity for this inspection requirement might make sense for Tunnel 1 since it has already been grouted, the inspection of Tunnel 2 needs to happen more frequently and this should match the inspection frequency described in both the deliverable for Corrective Action 2 of the Administrative Order and recent emails from DOE detailing both the means and frequency of inspections. (Email sent from DOE to Ecology on 12/22/17). | This sentence should be revised to reflect current practices for surveillance of both Tunnel 1 and 2. This should also be updated in the inspection plan. | WAC 173-303-680(3), WAC 173-303-320 | This statement is being deleted. The Inspection Plan was revised to address the surveillances to be conducted on Tunnels 1 and 2. | Agree | Close | |
| 4 | Addendum F, Section F.1.1.1, Pg. F.5, Lines 28-30 | This section states that personnel entry is only on a very limited basis. It is Ecology's understanding that due to the possibility of collapse for Tunnel 2, personnel entry will not be performed. | Update this section to be consistent with the findings under the Administrative Order Docket number 15419 including the feasibility in sending personnel into the tunnel and how internal communication will be performed during surveillances for tunnels 1 and 2. | WAC 173-303-340(1)(a) | Section F.1.1.1 was revised to clarify that personnel entry (1) is not possible in Tunnel 1 and (2) is currently prohibited in Tunnel 2 and will not be possible after grouting. | Agree | Close | |

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| 5 | Addendum F, Section F.1.1.4 Water for Fire Control, Pg. F.6, Lines 1-2 | "In the event that a fire resulted in the collapse of the tunnels, a recovery plan will be developed in accordance with emergency response procedures included in Addendum J." The contingency plan does not specifically address the scenario for failure of the Tunnels. In addition, the contingency plan needs to be revised to remove the OUO. | Revise the contingency plan to remove OUO, and to address response to collapse of the Tunnels. | WAC 173-303-350 | The contingency plan was revised to remove OUO markings and to incorporate changes resulting from grouting the tunnels. | Ecology will close this comment but defer to the open comments on the contingency plan regarding the need to implement the Contingency Plan in the event of a structural failure. | Close | |
| 6 | Addendum F, Section F.1.1.4, Pg. F.6, lines 4-5 | "Grouting conducted as an interim stabilization measure in response to the collapse discovered in May 2017 eliminates the void space and further reduces the potential for fire."<br>Fire risks related to grouting should be further expanded here. | Elaborate why the elimination of void spaces reduce the potential for fire and explain how the heat of hydration of the grout was taken into account. Or reference where in Appendix 4C this information is located. | WAC 173-303-340, WAC 173-303-680(2)(a) | Section F.1.1.4 was revised to clarify. | Agree | Close | |
| 7 | Addendum F, Section F.2.2., Pg. F.6, Lines 30-31 | "Grouting is not expected to impact the design features of the exterior of either tunnel; however, when grouting is complete, visual observations of the side slopes will be conducted to confirm the contours remain in a condition to ensure proper runoff…" This section does not describe how runoff will be controlled during grouting of Tunnel 2. Will the contouring be changed as part of the design for grouting Tunnel 2? | Provide additional information on how run-on and runoff will be controlled during grouting of Tunnel 2. | WAC 173-303-806(4)(viii)(B) | This section was revised to clarify. As noted in the text, grouting is not expected to change the exterior features of the tunnel that impact run-on/runoff (e.g. contouring). | Agree | Close | |
| 8 | Addendum F, Section F.2.2, Pg. F.6, Lines 38-39 | "After grouting, the potential for run-on contacting the waste within the tunnels is even further reduced." Expand this sentence to explain how the potential for run-on contacting the waste would be further reduced. | Further explain the likelihood of water infiltrating the grout and the potential to contaminate ground water. What is the possibility and impacts of a potential release of Dangerous Waste? Information here should include the depth of the ground water at the PUREX Tunnels site. | WAC 173-303-806(4)(viii)(B)<br><br>WAC 173-303-806(4)(viii)(C) | This section was revised to clarify and add a reference to groundwater depth. | Agree | Close | |
| 9 | Addendum F, Section F.2 Preventative Procedures, Structures, and Equipment, Pg. F.6-F.7 | Explain in this section how the prevention of release to the atmosphere was considered and how it applies to pre and post grouting scenarios. | See comment. | WAC 173-303-806(4)(viii)(F) | A new section F.4 on Control of Releases to the Atmosphere was added. | Agree | Close | |
| 10 | Addendum F, Section F.2.5 Personnel Protection Equipment, Pg. F.7 | During grouting and after grouting is complete, will personnel be required to use personnel protective equipment for work on or around the grouted tunnel? | Specify the use of personnel protection equipment during and after grouting activities are completed. | WAC 173-303-806(4)(viii)(E) | This section was revised to clarify use of PPE. | Agree | Close | |

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| 11 | Addendum F, Section F.3 Prevention of Reaction of Ignitable, Reactive and/or Incompatible Waste, Pg. F.7 | This section does not address the precautions taken in the event of a collapse of Tunnel 2 and accidental ignition of the silver nitrate. This description should include the impacts pre and post grouting. In addition, this section should address how removal would be accomplished with the silver nitrate being ignitable should removal be part of the remedial decision under CERLCA. | With the Tunnel 2 engineering evaluation showing a high risk of failure of Tunnel 2, the permit needs to detail the precautions that will be taken both pre and post grouting to prevent accidental ignition of the silver nitrate.<br><br>In addition, DOE needs to demonstrate the ability to complete removal of this waste (if chosen as part of the remedial decision) once grouted and how possible cutting or shearing of the grouted waste will not ignite. | WAC 173-303-395(1)(a) | As noted in the text, the silver nitrate in Tunnel Number 2 is contained within stainless steel vessels above the floor level, and is isolated from combustible materials and other dangerous waste. During and after grouting, the silver nitrate is not expected to require any additional protection or precautions to prevent accidental ignition. The text was revised to state that.<br><br>For the second part of the proposed modification, the closure addendum was revised to include a statement that the remedial design will have to ensure that the silver nitrate doesn't accidently ignite during cutting/removal if clean closure is selected. | Agree | Close | |
| | Class 3 Modification: Formal Submittal Comments | | | | | | | |
| 12 | Addendum F, Section F.1.1.1 Internal Communications, Pg. F.5, Lines 28-29 | "A portion of Tunnel Number 2 that does not contain dangerous waste may not be grouted…"<br><br>This sentence needs to clarify whether the entire Tunnel 2 will be grouted, or if only part of Tunnel 2 will be grouted. This information can be contained within the engineering design for Tunnel 2 and referenced here in Addendum F. | See comment | | The full length of Tunnel 2 will be grout filled. Section F.1.1.1 was revised. | | | |
| 13 | Addendum F, Section F.1.1.4 Internal Communications, Pg. F.6, Lines 4-8 | "…burning segments of the tunnel, including the portion of Tunnel Number 2 that does not contain dangerous waste and may not be filled with grout in the event…"<br><br>This sentence needs to clarify whether the entire Tunnel 2 will be grouted, or if only part of Tunnel 2 will be grouted. | See Comment | | The full length of Tunnel 2 will be grout filled. Section F.1.1.4, "Water for Fire Control", was revised.<br><br>Note that Section F.2.5, Personnel Protection Equipment, has also been revised to eliminate reference to grouting only a portion of Tunnel 2. | | | |
| 14 | Addendum F, Section F.1.1.4 Internal Communications, Pg. F.7, Lines 4-8 | "For potential situations where a natural catastrophic event occurs, inspections of the tunnel side slopes are conducted to ensure the contours remain in a condition that ensures proper runoff and continues to divert run-on away from the tunnel storage areas."<br><br>According to the Inspection Requirements, the tunnels will be inspected annually after grouting is complete. It is not clear whether inspections will be conducted after a natural catastrophic event occurs. | Clarify in the permit that the Tunnels will be inspected after a natural catastrophic event occurs that could impact the design of the tunnels. Or a reference to the Contingency Plan with this information would be sufficient. | | The text in F.2.2 "Runoff/Run-on" will be revised to read, "For potential situations where a natural catastrophic event occurs, inspections as required by the Contingency Plan will be conducted…." | | | |

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|---|---|---|

**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Formal Class 3 Permit Modification: PUREX Tunnels
Addendum I- Inspection Requirements

| Document Manager | | Project Manager | | Facility Site ID | Cleanup Site ID |
|---|---|---|---|---|---|
| Brigitte Weese | (509) 372-7936 | Stephanie Schleif | (509) 372-7929 | CUG – 25, WA7890008967 | |

| Item No. | Pg. # Sec. # Para./Sent. | Comment or Question | Modification Needed | Basis/Justification | U.S.D.O.E. Response | Ecology Response | Open/ Close | Reviewer Initials |
|---|---|---|---|---|---|---|---|---|
| 1 | Addendum I, Section I.1 and I.2, Pg. I.5-I.6 | Inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment. | For Tunnels 1 and 2, provide justification in the permit why annual inspections are deemed sufficient. This could be similar to the sentence found in the WESF Closure Plan, Section H5.2. | WAC 173-303-320 | Text was added to Section I.1 and I.2 that reads, "Annual inspections are sufficient because the waste is encapsulated with grout minimizing the potential for structural failure and release of dangerous waste constituents to the environment through normal aging of the structure. The identified inspection frequency is sufficient to detect the types of problems defined in Table I.1." *[Table I.2 for section I.2]* | | | |
| 2 | Addendum I, Section I.1 PUREX Storage Tunnels Number 1, Pg. I.5 | Include in this section, a statement that explains what the inspection requirements were during the grouting of Tunnel 1 (daily walk down inspections). | See Comment | | These walkdowns were not required by the permit and are no longer performed. Section I.1 is intended to describe inspection requirements going forward rather than precautionary measures that were taken in the past. This information is contained in CHPRC-03379, *Corrective Actions to Ensure Safe Storage of Waste in the Plutonium Uranium Extraction Plant Storage Tunnels 1 and 2*, provided to Ecology in response to Administrative Order (AO) 14156/Amended AO 15419. | | | |
| 3 | Addendum I, Section I.1 and I.2, Pg. I.5-I.6 | "Abnormal conditions are recorded, evaluated, and corrective action initiated as necessary."<br><br>Clarify the use of "abnormal conditions". See also Section 4.3 in the Process Addenda regarding anomalous conditions. | See Comment | | Text has been added to each section that reads, "Abnormal conditions means changes from previous observations of the exterior conditions of the tunnel that have the potential to affect the safe storage of dangerous wastes." | | | |

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|---|---|---|

**Document Title(s)/Number(s)**

**PUREX Order CA 3:** Formal Class 3 Permit Modification: PUREX Tunnels
Addendum J- Contingency Plan

| Document Manager | | Project Manager | | Facility Site ID | Cleanup Site ID |
|---|---|---|---|---|---|
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| Item No. | Pg. # Sec. # Para./Sent. | Comment or Question | Modification Needed | Basis/Justification | U.S.D.O.E. Response | Ecology Response | Open/ Close | Reviewer Initials |
|---|---|---|---|---|---|---|---|---|
| 1 | Addendum J, Section J.3.1 Dangerous and/or Mixed Waste, Pg. J.7, Lines 30-31 | "A seismic event, explosion, tornado, structural failure, or an aircraft crash could cause damage to the storage tunnels and could involve environmental exposure to mixed waste."<br><br>The contingency plan goes into detail for a seismic event, explosion, tornado, or aircraft crash (Sections J.3.3, J.3.4, J.3.5), but does not expand on structural failure. | Provide detail in the Contingency Plan for if a structural failure occurs. This should include the risk of a collapse after grouting and also the procedure that DOE will follow if one of the tunnels collapse within the 0-6 inch air gap (found in Tunnel 1 and possible in Tunnel 2). | | The last sentence in the first paragraph in Section J.3.1 was revised to read, "Grouting also removes the potential for further structural failure of the tunnels because the grout totally encapsulates the waste and fills the tunnel to within a short distance from the interior roof. Grout filled Tunnel Number 1 to within approximately 6 inches from the roof timbers. Similar conditions will exist after grouting of Tunnel Number 2. In the event that damage to the exterior of either tunnel were to occur, the soil overburden would fill the remaining gap and preclude the release of dangerous or mixed waste to the environment." | | | |
| 2 | Addendum J, Section J.3 Implementation of the Plan, Pg. J.7, Lines 3-13 | "The BED shall use the following guidelines to determine if an event has met the requirements of WAC 173-303-360(2)(d): …"<br><br>Guideline 1 (Line 5) does not cover an event involving the structural failure of the tunnel.<br>The "AND OR AND" statement needs to be updated to include structural failure. | Update the "AND OR AND" statement to include structural failure. | | According to WAC 173-303-360(2)(d) the guidelines apply if the "emergency coordinator determines that the facility has had a release, fire, or explosion". Although grouting eliminates the potential for future structural failure of the tunnels, such an event would require implementation of the Contingency Plan only if a release resulted from the event. As required by WAC 173-303-360(2)(d), releases are covered in guideline 1. | | | |
| 3 | Addendum J, Section J.3.1 Dangerous and/or Mixed Waste, Pg. J.7, Line 35-37 | "The grout encapsulates the stored waste and reduces the potential for environmental exposure to missed waste from the events described above to occur."<br><br>Should "missed" instead be "mixed"? | See Comment | | The text was revised to replace "missed" with "mixed". | | | |
| 4 | Addendum J, Section J.3.2 Fire or Explosion, Pg. J.8, Lines 4-6 | "Should the fire continue to spread, heavy equipment and cranes will be called to the scene to cover areas burning segments of the tunnels."<br><br>Provide clarification on this sentence. Should "areas" be deleted? | See Comment | | The text was revised to delete the word "areas". | | | |

| Item No. | Pg. #<br>Sec. #<br>Para./Sent. | Comment or Question | Modification Needed | Basis/Justification | U.S.D.O.E. Response | Ecology Response | Open/ Close | Reviewer Initials |
|---|---|---|---|---|---|---|---|---|
| 5 | Addendum J, Section J.4 Unit/Building Emergency Response Procedures, Pg. J.9 | This section should also reflect the risk of structural failure. | Provide procedures for structural failure. | | As described in the response to Comment 1, grouting eliminates the potential for the release of dangerous or mixed waste to the environment as a result of a structural failure. | | | |

# PUREX Storage Tunnel #1 and Tunnel #2 Characterization /Mapping

The following documentation summarizes the inventory contained within PUREX Storage Tunnel #1 and Tunnel #2. As received from Ecology, Tables 2 (*Ecology PUREX Storage Tunnel # 1 Characterization/Mapping)* and 3 (*Ecology and PUREX Storage Tunnel #2 Characterization/Mapping*) have been edited and updated to ensure technical accuracy and the tables reflect available information.

To assist in review and clarification of terminology, the following information is provided.

Except for instrumentation, a cell equipment piece is identified by a sequential combination of letters and numbers designating its description, cell location, and cell equipment number. For example, TK-F12 designates a tank (TK) in F Cell, vessel number 12. The principal descriptive identification letters are summarized in Table 1.

**Table 1. Canyon Equipment Identification Letters**

| Letter | Equipment Piece |
|---|---|
| A | agitator |
| E | condenser, concentrator, heater (steam) |
| F | filter |
| G | centrifuge |
| H | heater (electric) |
| J | jet |
| JGV | jet gang valve |
| PG | pulse generator |
| PM | pulse motor |
| P | pump |
| SPLP | sampler pot |
| TK | tank |
| T | tower (column) |

The nine column headings in Tables 2 and 3 are defined as follows:

Position – This column shows the order that the cars were placed in the tunnel, with the placement date in parentheses underneath. The tunnel has only one entrance/exit, so position 1 contains the first railcar placed in the tunnel.

Equipment Stored – This column shows the items cited on the inventory sheets, along with the associated PUREX Facility component number, if known.

Process Origin – This column shows the plant subsystem with which this component was associated (e.g., Metal Dissolution & Feed Prep).

Process Streams – This column shows the inlet and outlet process streams associated with this component.

Hazardous Constituents – This column shows the known chemical hazards associated with the items in that position.

Grams Transuranic – This column provides a conservative estimate in grams for known transuranic elements.

Radiological Inventory – This column shows the total curie content of the inventory items plus the recorded dose rate. These values are from the time that the railcar was initially placed in the tunnel. Additionally, total container volumes are provided with this data.

Estimated Radiation Type – This column provides an estimation of the radiological inventory components (e.g., what percentage of the inventory are actinides, fission products, activation products).

Waste Codes – This column indicates the dangerous waste codes associated with the items identified in the Hazardous Constituents column.

# Table 2. Ecology PUREX Storage Tunnel #1 Characterization/Mapping

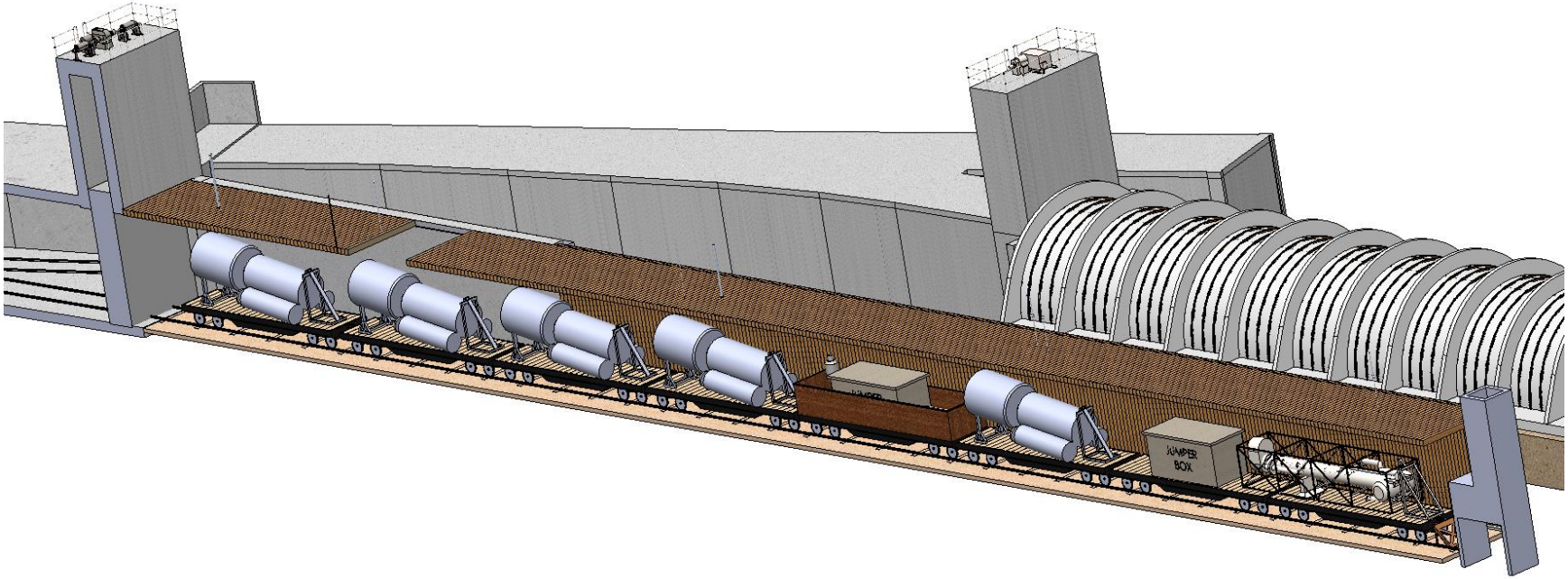

Table 2. Ecology PUREX Storage Tunnel #1 Characterization /Mapping

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **1 & 2**<br>(6/60) | **T-H2 HA Column**<br>(H-2-58372)<br><br>**Jumpers in Box** | First Decontamination and Partition Cycle | **Inlet Streams**<br>HAF, CRD, HAS, 3WB-HA, HAX, Rec $HNO_3$, Water<br>**Outlet Streams**<br>HAP, HAW | ~ 115 kg Pb (counterweights) | 1,500 | **T-H2:**<br>400 Curies<br>5 rem/hr. @ 60'<br>4,700 $ft^3$<br><br>**Jumpers:**<br>2,000 curies<br>2,190 $ft^3$ | **T-H2:**<br>8% Actinides<br>92% Fission Products<br><br>**Jumpers:**<br>16 % Actinides<br>83% Fission Products<br>1% Activation Products | **Pb:**<br>D008 |
| **3**<br>(7/29/60) | **E-F11 Concentrator** | Material Dissolution and Feed Preparation | **Inlet Streams**<br>ASF, NaOH<br>**Outlet Streams**<br>ASW, Offgas | N/A | 0 | 40,000 Curies<br>12.5 rem/hr. @ 100'<br>1,900 $ft^3$ | RuRh-106 | N/A |
| **4**<br>(12/24/60) | **G-E2 Centrifuge**<br><br>**2 Tube Bundles**<br><br>**Jumpers in Box** | Material Dissolution and Feed Preparation | **Inlet Streams**<br>Decladding waste, Spent Metathesis Solution<br>**Outlet Streams**<br>Slurried Centrifuge Cake, Decladding Waste, Centrifuged Spent Metathesis Solution, Offgas | ~ 115 kg Pb (counterweights) | 130 | 3,000 curies<br>1.5 rem/hr. @ 150'<br>2,465 $ft^3$ | 1% Actinides<br>6% Fission Products<br>93% Activation Products | **Pb:**<br>D008 |
| **5**<br>(1/4/61) | **E-H4 Concentrator** | Backcycle Waste | **Inlet Streams**<br>3WF<br>**Outlet Streams**<br>3WW and Offgas | N/A | 2,900 | 1,000 Curies<br>150 mrem/hr. @ 50'<br>2,336 $ft^3$ | 0.04% U<br>67% Pu<br>33% Fission Products | N/A |
| **6**<br>(4/21/61) | **E-F6 Concentrator** | Waste Concentration and Treatment | **Inlet Streams**<br>1WF, 1WR, Water, Offgas from 1WW Denitration<br>**Outlet Streams**<br>Offgas, 1WW | N/A | 240 | 700 Curies<br>5 rem/hr. @ 20'<br>2,336 $ft^3$ | 8% Actinides<br>92% Fission Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **7**<br>(2/8/62) | **E-F11 Concentrator** | Material Dissolution and Feed Preparation | **Inlet Streams**<br>ASF, NaOH<br>**Outlet Streams**<br>ASW, Offgas | N/A | 0 | 40,000 Curies<br>25 rem/hr. @ 150'<br>2,336 $ft^3$ | RuRh-106 | N/A |
| **8**<br>(1/22/65) | **E-F6 Concentrator**<br><br>**Rail Car HO-10A-3621** | Waste Concentration and Treatment | **Inlet Streams**<br>1WF, 1WR, Water, Offgas from 1WW Denitration<br>**Outlet Streams**<br>Offgas, 1WW | N/A | 240 | 700 Curies<br>5 rem/hr. @ 20'<br>2,400 $ft^3$ | 8% Actinides<br>92% Fission Products | N/A |

# Table 3. Ecology PUREX Storage Tunnel #2 Characterization/Mapping

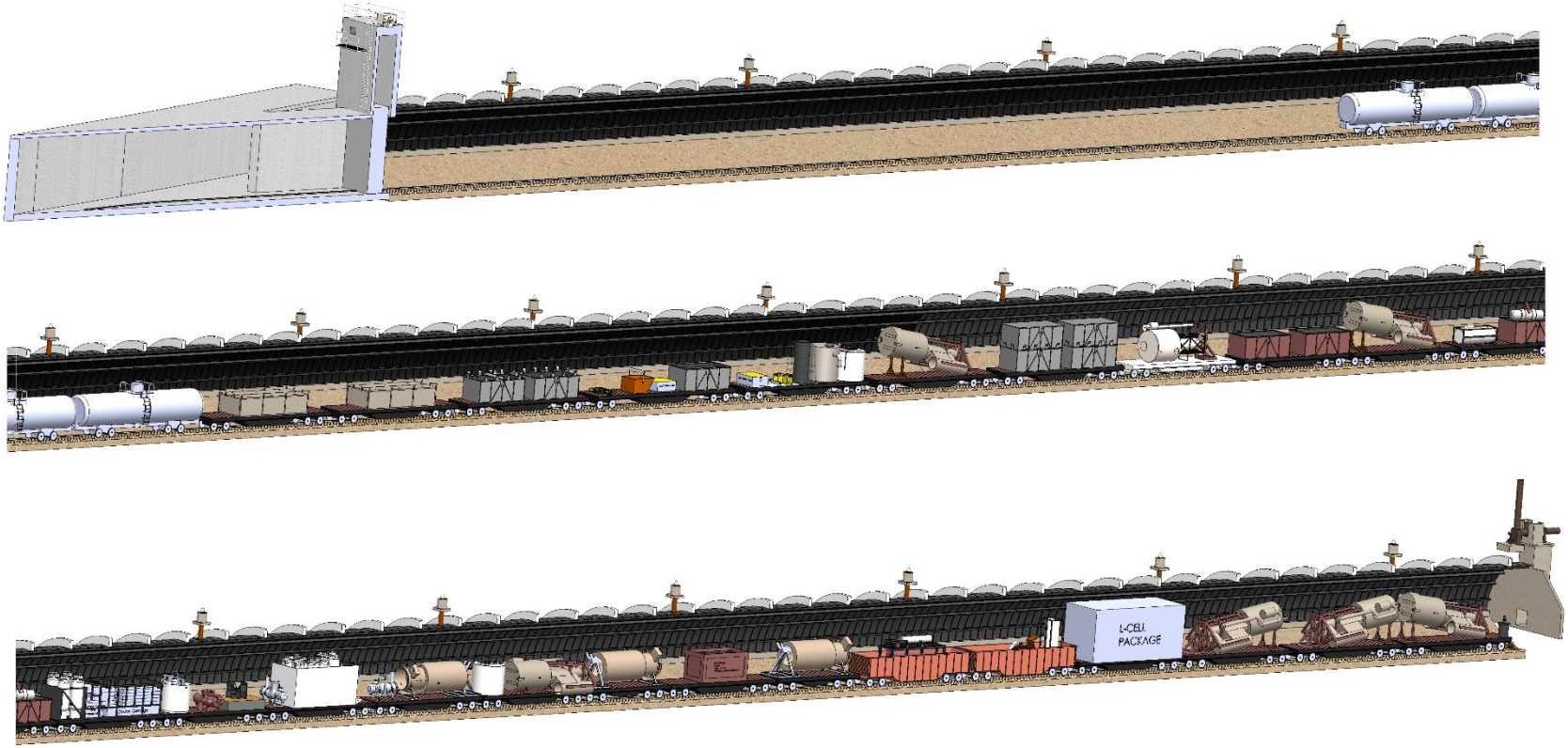

Table 3. Ecology PUREX Storage Tunnel #2 Characterization /Mapping

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **1**<br>(12/12/67) | **E-F6 Concentrator**<br><br>**Tube Bundle**<br>H-2-52550<br><br>**TK-F15-2 Tank**<br><br>**Agitator Motor**<br><br>**Rail Car 61439** | **E-F6:**<br>Fission Product Waste Concentration<br><br>**TK-F15-2:**<br>Waste Concentration & Treatment | **Inlet Streams**<br>E-F6: 1WF, 1WR, Water, TK-F15 Offgas<br>TK-F15: 1WW, Sugar<br><br>**Outlet Streams**<br>E-F6: 1WW, Offgas to T-F6-2<br>TK-F15-2: 1WW, WRP, Offgas to E-F6 | N/A | 41 | 700 curies<br><br>1.3 rem/hr. @ 100'<br><br>2,400 $ft^3$ | 8% Actinides<br>92% Fission Products | N/A |
| **2**<br>(3/26/69) | **E-F6 Concentrator**<br>(Previously E-H4)<br><br>**2 Tube Bundles**<br><br>**Rail Car MILW 60883** | **E-F6:**<br>Waste Concentration & Treatment Backcycle Waste | **Inlet Streams**<br>E-F6: 1WF, 1WR, Water, TK-F15 Offgas<br><br>**Outlet Streams**<br>E-F6: 3WW, 1WW, Offgas to T-F6-2 | N/A | 29 | 500 curies<br><br>0.8 rem/hr. @ 2'<br><br>2,400 $ft^3$ | 8% Actinides<br>92% Fission Products | N/A |
| **3**<br>(3/19/70) | **E-F6 Concentrator**<br><br>**2 Tube Bundles**<br><br>**Rail Car 3612** | Waste Concentration & Treatment | **Inlet Streams**<br>E-F6: 1WF, 1WR, Water, TK-F15 Offgas<br><br>**Outlet Streams**<br>E-F6: 1WW, Offgas to T-F6-2 | N/A | 41 | 700 curies<br><br>0.5 rem/hr. @ 2'<br><br>2,400 $ft^3$ | 8% Actinides<br>92% Fission Products | N/A |
| **4**<br>(12/30/70) | **L Cell Package**<br><br>**Rail Car MILW 60033** | Final Pu Cycles | **Inlet Streams**<br>2BP, $HNO_3$, 3AS, 3BX, 3AF, Water, 3AX, 3BP<br><br>**Outlet Streams**<br>3AW, 3BW, PCP, Offgas | N/A | 500 | 500 grams<br><br>0.2 rem/hr. @ contact<br><br>2,400 $ft^3$ | 100% Pu | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **5**<br>(2/26/71) | **T-F2 Silver Reactor**<br><br>**T-F6 Demister**<br><br>**Vessel Vent**<br><br>**Catwalk**<br><br>**Guard Rails**<br><br>**Gondola Car 4610** | **T-F2:**<br>Process Vent System (PVS)<br><br>**T-F6:**<br>Waste Concentration & Treatment | **Inlet Streams**<br>T-F2: Vents from vessels & condensers<br>T-F6: E-F6-1 Offgas, Water<br><br>**Outlet Streams**<br>T-F2: Vents from vessels & condensers (less free halogens)<br>T-F6: AAF, 1WR | ~625 kg Ag<br><br>(Silver Salts as Silver Nitrates) | 0 | 20 curies<br><br>2 rem/hr. @ contact<br><br>2,400 $ft^3$ | I-129 | **Ag:**<br>D001<br>D011 |
| **6**<br>(12/12/71) | **T-A3-1 Downdraft Dissolver Condenser Tower**<br>(modified)<br><br>**Scrubber**<br>(likely T-A3 $NH_3$ Scrubber)<br><br>**Lid & Vapor Line**<br><br>**Gondola Car 4611** | **T-A3-1 Mod:**<br>Material Dissolution & Feed Preparation<br><br>**Scrubber:**<br>Material Dissolution & Feed Preparation | **Inlet Streams**<br>T-A3-1 Mod: TK-A3 Dissolver Offgas<br>Scrubber: T-A3-1 Offgas, Water<br><br>**Outlet Streams**<br>T-A3-1 Mod: Offgas to Scrubber, Acid to TK-A3 Dissolver<br>Scrubber: Acid to TK-A3, Waste & Fission Product to $NH_3$ Catch Tank & Heater | N/A | 0 | 10 curies<br><br>1 rem/hr. @ contact<br><br>2,400 $ft^3$ | Ru-109 | N/A |
| **7**<br>(12/22/71) | **TK-A3 Annular Dissolver**<br><br>**Rail Car B58**<br>(Shortened 9 ft.) | Material Dissolution & Feed Preparation | **Inlet Streams**<br>Zircaloy Clad Metal Chemicals, Rec $HNO_3$, Metathesis solution<br><br>**Outlet Streams**<br>Recladding waste metathesis solution, dissolved Pu, U, or Np, & Offgas | ~45 kg Hg (elemental) | 2.9 | 50 curies<br><br>5 rem/hr. @ 5'<br><br>2,400 $ft^3$ | 8% Actinides<br>89% Fission Products<br>3% Activation Products | **Hg:**<br>D009 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **8**<br>(8/29/72) | **A1W1 Fuel Ends**<br><br>**New Production Reactor (NPR) Fuel Handling Equipment**<br><br>**Steel Liner Box**<br><br>**Rail Car 19808** | **Reactor Fuel**<br>(Idaho) | **Spent Fuel - N/A** | N/A | 1,000 | 17,500 curies<br><br>10 rem/hr. @ 150'<br><br>800 $ft^3$ | Unknown | N/A |
| **9**<br>(9/30/72) | **TK-C3 Annular Dissolver**<br><br>**Rail Car 19811** | Material Dissolution & Feed Preparation | **Inlet Streams**<br>Zircaloy Clad Metal Chemicals, Rec $HNO_3$, Metathesis solution<br><br>**Outlet Streams**<br>Recladding waste metathesis solution, dissolved Pu, U, or Np, & Offgas | ~45 kg Hg (elemental) | 2.9 | 50 curies<br><br>5 rem/hr. @ 5'<br><br>1,590 $ft^3$ | 8% Actinides<br>89% Fission Products<br>3% Activation Products | **Hg:**<br>D009 |
| **10**<br>(8/30/83) | **E-H4 Concentrator (3WB)**<br><br>**#61 Tube Bundle**<br><br>**Prototype Cooling Coil**<br><br>**F-F1 Filter Tank**<br><br>**Rail Car CDX-1** | **E-H4:** Backcycle Wash<br><br>**E-F1:** Process Vent System (PVS) | **Inlet Streams**<br>E-H4: 3WF<br>F-F1: Halogen free vent from Silver Reactor<br><br>**Outlet Stream**<br>E-H4: 3WW, Offgas<br>F-F1: Vent to building air filters | N/A | 29 | 500 curies<br><br>0.8 rem/hr. @ 2'<br><br>2,400 $ft^3$ | 0.04% Actinides<br>67% Pu<br>33% Fission Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **11**<br>(1/18/86) | **TK-A3 Annular Dissolver**<br>(Vessel #10)<br><br>**E-A2 Steam Offgas Heater**<br>(Vessel #6)<br><br>**Rail Car 3613** | Material Dissolution & Feed Preparation | **Inlet Streams**<br>TK-A3: Zircaloy Clad Metal Chemicals, Rec $HNO_3$, Metathesis solution<br>E-A2: $NH_3$ Scrubber Offgas<br><br>**Outlet Streams**<br>TK-A3: Recladding waste metathesis solution, dissolved Pu, U, or Np, & Offgas<br>E-A2: Hot Offgas | ~40 kg Hg (elemental)<br><br>~43 kg Cd (jacketing) | 0.02 | 0.81 curies<br><br>3 mrem/hr. @3'<br><br>3,960 $ft^3$ | 8% Actinides<br>89% Fission Products<br>3% Activation Products | **Hg:**<br>D009<br><br>**Cd:**<br>D006<br>WT02 |
| **12**<br>(1/20/86) | **8 Tube Bundles**<br><br>**PG-J6 Pulser #5**<br><br>**Dissolver Lid**<br><br>**9 Dumping Trunnions**<br><br>**White Box**<br>(H-2-58456)<br><br>**Rail Car 3611** | First Decontamination & Partition Cycle | **Inlet Streams**<br>1BXF<br><br>**Outlet Streams**<br>1BXF | N/A | 31 | 540 curies<br><br>2 rem/hr. @ 3'<br><br>5,438 $ft^3$ | 16% Actinides<br>83% Fission Products<br>1% Activation Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **13**<br>(1/21/86) | **TK-J5 2A Feed Tank**<br>(Vessel #30)<br><br>**E-F1 Condenser**<br>(Vessel #13)<br><br>**F12-B Cell Block**<br><br>**Dissolver 4-Way Dumper**<br><br>**Dissolver Yoke**<br><br>**Flange Plate**<br><br>**Rail Car 19806** | **TK-J5:**<br>Final Pu Cycles<br><br>**E-F1:**<br>Process Vent System (PVS) | **Inlet Streams**<br>TK-J5: 1BP, Fresh $HNO_3$ & 2AF-$NO_3$<br>E-F1: Vents from Vessels & Condensers<br><br>**Outlet Streams**<br>TK-J5: 2AF<br><br>E-F1: Offgas & Condensate to TK-F12 via TK-F1 | N/A | 31 | 90 curies<br><br>3 mrem/hr. @ 1'<br><br>2,500 $ft^3$ | 94% Pu<br>6% Fission Products | N/A |
| **14**<br>(11/18/87) | **L-1 Pulser**<br>**2 Column Cartridges**<br>**Jumper Cutter Storage Rack**<br>**3 Jumper Alignment Tools**<br>**9 Exterior Dumping Trunnions**<br>**10 Pumps**<br>**3 Agitators**<br>**4 Tube Bundles**<br>**2 Vent Jumpers**<br>**7 Yokes**<br><br>**Rail Car PX-10** | Final Pu Cycles | **Inlet Streams**<br>Serves T-L1 Column: 2AF, 2AX, Fresh $HNO_3$ & Water<br><br>**Outlet Streams**<br>Serves T-L1 Column: 2AP & 2AW | ~2,540 kg Pb | 1,900 | 33,740 curies<br><br>5 rem/hr. @ 15'<br><br>3,600 $ft^3$ | 16% Actinides<br>83% Fission Products<br>1% Activation Products | **Pb:**<br>D008 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **15**<br>(5/13/88) | **T-A2 Silver Reactor**<br>(#5 Spare)<br><br>**E-F2 Steam Heater**<br><br>**Burial Liner**<br>(H-2-65095)<br><br>**Jumpers**<br><br>**S/R Cradle**<br><br>**Rail Car PX-9** | Process Vent System (PVS) | **Inlet Streams**<br>T-A2: Vents from Vessels & Condensers<br>E-F2: Dry Vent Gas from Condensers & Vessels<br><br>**Outlet Streams**<br>T-A2: Vents from Vessels & Condensers (less free halogens)<br>E-F2: Hot dry vent gas | ~13 kg Cd<br><br>~115 kg Ag (Silver Salts as Silver Nitrates)<br><br>~230 kg Pb | 13 | 240 curies<br><br>20 mrem/hr. @ 20'<br><br>2,775 $ft^3$ | 15.5% Actinides<br>80.5% Fission Products<br>1% Activation Products<br><br>(7.4 curies I-129) | **Ag:**<br>D011<br>D001<br><br>**Cd:**<br>D006<br>WT02<br><br>**Pb:**<br>D008 |
| **16**<br>(3/11/89) | **E-J8-1 Unitized Concentrator Vessel**<br>(H-2-52477)<br><br>**Rail CarPX-6** | First Decontamination & Partition Cycle | **Inlet Streams**<br>1CU, 3WD<br><br>**Outlet Streams**<br>1UC, Offgas | N/A | 0.4 | 1.5 curies<br><br>0.5 mrem/hr. @ 10'<br><br>6,000 $ft^3$ | 46% U<br>23% Pu<br>30% Fission Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **17**<br>(8/5/89) | **North Storage Liner**<br>(H-2-65095)<br><br>6 Pumps<br>Agitator<br>Cut Up Jumpers<br>(14 tons)<br><br>**South Storage Liner**<br>(H-2-65095)<br><br>Pump<br>#15 yoke<br>Cut Up Jumpers<br>(15.5 tons)<br><br>**Rail Car PX-19** | Various from PUREX Canyon | Various | N/A | 0.1 | 3.0 curies<br><br>80 mrem/hr. @ 1'<br><br>2,574 $ft^3$ | 16% Actinides<br>83% Fission Products<br>1% Activation Products | N/A |
| **18**<br>(4/8/94) | **T-F5 Acid Absorber**<br><br>**Rail Car PX-2** | Waste Concentration & Acid Recovery | **<u>Inlet Streams</u>**<br>AAF from E-F6, AAR from E-F5. ANN, Water<br><br>**<u>Outlet Streams</u>**<br>AAA to TK-F3,<br>Vapor to E-F6.<br>Offgas to stack | N/A | 14 | 185 curies<br><br>90 mrem/hr. @ contact<br><br>835 $ft^3$ | 8.3% Actinides<br>91.7% Fission Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **19**<br>(9/16/94) | **4 Metal Liner Storage Boxes**<br>(H-2-65095-3)<br>(H-2-100187-0)<br><br>**Failed Jumpers**<br><br>**Misc. Obsolete Canyon Equipment**<br><br>**Rail Car PX-23** | Various from PUREX Canyon | Various | N/A | 130 | 927 curies<br><br>30 mrem/hr. @ 2'<br><br>4,032 $ft^3$ | 16% Actinides<br>83% Fission Products<br>1% Activation Products | N/A |
| **20**<br>(1/27/95) | **E-H4-1 Unitized Concentrator**<br>(H-2-52477)<br>(H-2-56213)<br><br>**Rail Car PX-28**<br>(H-2-131680) | Backcycle Waste | **Inlet Streams**<br>3WF<br><br>**Outlet Stream**<br>3WW, Offgas | ~8 kg Cr | 0 | 3,070 curies<br><br>1 rem/hr. @ 5'<br><br>5,760 $ft^3$ | 100% Fission Products | **Cr:**<br>D007 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **21**<br>(2/8/95) | **TK-E5 Coating Waste Tank**<br>(H-2-52453)<br><br>**Lead Storage Box Assembly**<br>(H-2-131629)<br><br>**H4 Concentrator Tower**<br>(H-2-58102)<br><br>**Hot Shop "Q" Cover Plate**<br>(H-2-52222)<br><br>**Tube Bundle Wash Capsule**<br>(H-2-58647)<br><br>**Dissolver Charging Insert**<br>(H-2-75875)<br><br>**Lifting Yoke #7A**<br>(H-2-96837)<br><br>**Lifting Yoke #9**<br>(H-2-52458)<br><br>**Rail Car PX-3609** | **TK E-5:**<br>Material Dissolution & Feed Preparation (Coating Waste)<br><br>**H4 Tower:**<br>Backcycle Waste | **Inlet Streams**<br>E-H4: 3WF<br>TK-E5: Metathesis Solution<br><br>**Outlet Stream**<br>E-H4: 3WW, Offgas<br>TK-E5: Metathesis Solution to UGS | ~1,830 kg of Pb | 1,600 | 26,000 curies<br><br>1 rem/hr. @ 4'<br><br>3,457 $ft^3$ | **TK-E5:**<br>6.9% Actinides<br>93.1% Fission Products<br><br>**E-H4:**<br>100% Fission Products | **Pb:**<br>D008 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **22**<br>(3/11/96) | **Metal Liner Box:**<br>(H-2-65096)<br><br>**Jumpers**<br>**Failed Obsolete Equipment**<br><br>**F7 Neutron Monitor Pig**<br>(H-2-75825)<br><br>**Lead Storage Box:**<br>(H-2-131629)<br><br>**Jumper Counterweights**<br>**Misc. Lead Items**<br><br>**Scrap Hopper:**<br>(H-2-57347)<br><br>**Misc. Canyon Equipment**<br><br>**Canister Capping Station**<br>(H-2-821831)<br><br>**Test Canister Containing Carbon Steel Pipe**<br>(various lengths)<br><br>**Rail Car 3616** | Various from PUREX Canyon | Various | ~3,232 kg Pb<br><br>~2 kg Cd (sheets in pig) | 2.1 | 15 curies<br><br>100 mrem/hr. @ 1'<br><br>1,712 $ft^3$ | | **Cd:**<br>D006<br>WT02<br><br>**Pb:**<br>D008 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **23**<br>(3/11/96) | **2 Burial Boxes:**<br>(H-2-100187)<br><br>**Jumpers**<br><br>**Failed/Obsolete Canyon Equipment**<br><br>**Lifting Yoke**<br>(H-2-99652)<br><br>**Rail Car PX-31** | Various from PUREX Canyon | Various | N/A | 0.3 | 2 curies<br><br>10 mrem/hr. @ 1'<br><br>2,116 $ft^3$ | 16% Actinides<br>83% Fission Products<br>1% Activation Products | N/A |
| **24**<br>(4/26/96) | **Concrete Burial Box #5-50**<br><br>**8 containers of 324 Facility B-Cell Waste**<br><br>**Railcar PX-29**<br>(H-1-44980) | 324 Facility B Cell Cleanout | Various | ~1,802 kg Pb<br><br>~10.5 kg Cd<br><br>~8.5 kg Absorbed Mineral Oil<br><br>~1 kg Cr<br><br>~3 kg Ba | 24 | 244,000 curies<br><br>~15 mrem/hr. @ 150'<br><br>1,890 $ft^3$ | 0.0% Actinides<br>100% Sr-90/Cs-137 | **Cr:**<br>D007<br><br>**Cd:**<br>D006<br>WT02<br><br>**Pb:**<br>D008<br><br>**Mineral Oil:**<br>WT02<br><br>**Ba:**<br>D005 |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **25**<br>(6/12/96) | **Concrete Burial Box #23014**<br><br>**9 Containers of 324 & 325 Facility Waste**<br><br>**Rail Car 10A-3619**<br>(H-1-44980) | 324 Facility B Cell Cleanout | Various | ~4.2 g Ba<br>1 g Cd<br>~1.8 g Cr<br>1 g Pb | 43 | 1,750,000 curies<br><br>~200 mrem/hr. @ 150'<br><br>1,890 $ft^3$ | 0.0% Actinides<br><br>100% Sr-90/Cs-137 | **Cr:**<br>D007<br><br>**Cd:**<br>D006<br>WT02<br><br>**Pb:**<br>D008<br><br>**Ba:**<br>D005 |
| **26**<br>(6/19/96) | **20,000 Gallon Liquid Waste Tank Car (LWTC)**<br><br>**Rail Car HO-10H-18582**<br>(H-6-326)<br><br>**Empty per RCRA** | Liquid Waste Transportation from N Reactor or 300 Area to Tank Farms | Various | N/A | 11 | 23 curies<br><br>650 mrem/hr. @ 3'<br><br>~30 tons | 97% Actinides<br>3% Fission Products | N/A |
| **27**<br>(6/19/96) | **20,000 Gallon Liquid Waste Tank Car (LWTC)**<br><br>**Rail Car HO-10H-18579**<br>(H-6-326)<br><br>**Empty per RCRA** | Liquid Waste Transportation from N Reactor or 300 Area to Tank Farms | Various | N/A | 130 | 9 curies<br><br>300 mrem/hr. @ 3'<br><br>~30 tons | 90% Actinides<br>10% Fission Products | N/A |

| Position (Placed) | Equipment Stored | Process Origin | Process Streams | Hazardous Constituents | Grams Transuranic (estimated) | Radiological Inventory | Estimated Radiation Type (% of Curies) | Waste Codes |
|---|---|---|---|---|---|---|---|---|
| **28**<br>(6/19/96) | **20,000 Gallon Liquid Waste Tank Car (LWTC)**<br><br>**Rail Car HO-10H-18580**<br>(H-6-326)<br><br>**Empty per RCRA** | Liquid Waste Transportation from N Reactor or 300 Area to Tank Farms | Various | N/A | 53 | 5.4 curies<br><br>100 mrem/hr. @ 3'<br><br>~30 tons | 65% Actinides<br>35% Fission Products | N/A |

## References


1. WHC-IP-0977, *Estimation of PUREX Equipment and Materials that are Candidates for Removal and Waste Processing during PUREX Plant Closure*
2. HNF-SD-EN-WAP-007, Rev 4, *PUREX Storage Tunnels Waste Analysis Plan*
3. RHO-MA-116, *PUREX Technical Manual*
4. 96-EAP-111, *Request for approval of NOC*