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OCT 15 2018

18-TF-0085
REISSUE

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

Ms. Smith:

REISSUE - RESPONSE TO ECOLOGY COMMENTS ON THE 242-A EVAPORATOR SYSTEM INTEGRITY ASSESSMENT REPORT, RPP-RPT-60098

Reference: "Department of Ecology's (Ecology) Comments on the 242-A Evaporator System Integrity Assessment Report, RPP-RPT-60098, Revision 0," 18-NWP-114, dated July 19, 2018.

This letter is being reissued due to the attachment, RPP-RPT-60098, Evaporator Integrity Assessment Report Comments, item 12 on page eight, was revised to correctly indicate the SL-168 valve pit leak detectors are associated with the AW-A valve pit and the SL-167 valve pit leak detectors are associated with the AW-B valve pit.

This letter provides the responses to the Washington State Department of Ecology's comments on the 242-A Evaporator System Integrity Assessment Report, RPP-RPT-60098 as provided by the Independent Engineer, the U.S. Department of Energy, Office of River Protection, and Washington River Protection Solutions LLC Engineering. If any concerns raised have not been addressed, please contact Mr. Paul Hernandez to arrange a meeting.

If you have any questions, please contact Mr. Hernandez, Project Manager for the 242-A Evaporator, Tank Farms Programs, at (509) 376-2209; or Jessica Joyner, Environmental Protection, Washington River Protection Solutions LLC, at (509) 376-7533.

Mark A. Lindholm,
President and Project Manager
Washington River Protection Solutions LLC

for

Brian T. Vance, Manager
Office of River Protection

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Attachment

cc: See page 2

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cc w/attach:
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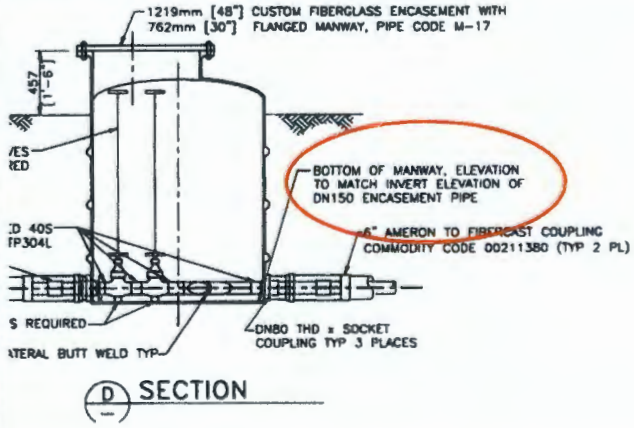
ATTACHMENT

18-TF-0085 REISSUE

Table RPP-RPT-60098, Rev 0 242-A Evaporator Integrity Assessment Report Review Comments.

Table. RPP-RPT-60098, Rev 0 *242-A Evaporator Integrity Assessment Report* Review Comments
(Source: 18-NWP-114, "Department of Ecology's (Ecology's) Comments on the *242-A Evaporator System Integrity Assessment Report*," RPP-RPT-60098, Revision 0, dated July 19, 2018)

1	<u>Sections 2.1.5, 5.3.3, 5.3.3.2.1</u> The Evaporator IAR says: **5.3.3 PC-5000 Process Condensate Transfer Line Evaluation** The PC-5000 transfer line is a 4,918-ft underground line consisting of a 3-in. primary transfer line inside a 6-in. secondary containment pipe. Electronic leak detection was originally provided at 1000-ft intervals along the transfer line. However, due to a history of false alarms, the automatic leak detection system is not utilized. Visual confirmation of no leakage into the encasement has been used since 2003. **5.3.3.2.1 PC-5000 Drain Line Modifications** IAR PC-5000, *242-A PC-5000 Drain Line Modifications*, was performed on modifications to the PC-5000 line. This assessment was issued under RPP-RPT-46117, *242-A PC-5000 Drain Line Modifications Independent Integrity Assessment Report*, Rev. 0. Modifications were made to the PC-5000 drain line system to improve the efficiency of operations and to re-establish the design function of the PC-5000 drain line leak detection system. Six leak detectors within the secondary containment casing were replaced and new secondary containment fittings with better sealing properties were installed on the leak detector risers. Also, an integral catch tank was installed at the end of the secondary containment casing at the LERF to collect any leakage from the primary containment piping. This report indicates that the modification to the leak detectors was adequately designed to prevent failure caused by corrosion or by structural loads imposed by the systems intended service provided the operating procedures require that the catch tank be drained of any leakage from the primary pipe within 24 hours. No NCRs were generated for this project. This modification was not successful in reducing the false alarms from the leak detection system. Visual inspection of the encasement drain tank at the LERF is being relied upon for leak detection. The WA78902008967 Hanford Dangerous Waste Permit, Rev. 8C, requires that the visual inspections of the transfer line encasement occur at a minimum of once every 24 hours during waste transfers through the PC-5000 line. This is an acceptable means of leak detection. The drawings H-2-88766 Sh 1 and H-2-830102 Sh 2 show the valve pit MH-WTP-01 that was installed by Project W-211 in 2002 where the WTP backup radioactive liquid effluents line ties into the PC-5000 line. It appears from the drawings that the encasement for the PC-5000 line does not continue through the valve pit. Meaning that any leaks in the upper portion of the PC-5000 line would not flow to the catch tank down by LERF and would not be detected by the visual inspection. The procedure ETF-ARP-60M-001 for the LERF/ETF addresses visual inspection of the catch tank if a leak is indicated. There does not appear to be a procedure for visual inspection of the valve pit while the Evaporator is operating. For any leaks to be detected in the catch tank appears to require accumulating liquid in the valve pit to a level that it overflows into the encasement of the connecting line down to LERF. From the drawing, the valve pit itself does not	In 2002, a new line from WTP was installed and connected to the PC-5000 line in a valve pit (MH-WTP-01), as shown on drawing H-2-830102 (see detail section D on H-2-830102). The encasement on PC-5000 is discontinuous through the pit. However, per the detail referenced, the bottom of the manway is at the same level as the invert of the PC-5000 line. Hence, if there is a leak, the effluent would continue through the pit and enter the encasement of the PC-5000 line on the other side and be detected by visual examination as indicated in the 2007 Integrity Assessment. Therefore, the valve pit is fit for use and the IQRPE should have included pit MH-WTP-01 in Appendix C as Fit for Use. Likewise, the overall assessment is unchanged.  Permit modifications are not a requirement listed for WAC 173-303-640(2)(e) assessments (last bullet)

	appear to have electronic leak detection. Also, the radioactive liquid effluent line from the WTP entering the valve pit appears on the drawing to have some sort of electronic leak detection. The plans for demonstrating its operation are unknown, but there may be similar issues with leak detection for that line. There are several concerns with all this: 1a • A significant portion of the PC-5000 line may not have adequate leak detection. (A short-term solution for the next Evaporator campaign may be to institute daily inspections of the valve pit via a process memo.) 1b • The integrity of the valve pit was not addressed anywhere in the Evaporator integrity assessment, which may indicate the IQRPE did not walk down the line or look at the drawings. 1c • The description in the Site-wide DW permit of the leak detection system for the PC-5000 line is not accurate and apparently has not been since 2003. Leak detection for the PC-5000 line and integrity of the valve pit needs to be addressed in the Evaporator IAR, and the description of the leak detection system needs to be revised in the permit.	
2	<u>Sections 2.1.3, 3.1.1, 6.1</u> The integrity of the stainless steel liner in the Pump Room Sump and on the Pump Room floor was not addressed in the Evaporator IAR. Only a physical description is provided. Structural integrity of the sump liner was addressed in the 2007 Evaporator IAR (RPP-RPT-33306, Section 2.1.4.3) but not leak integrity. Sumps are managed as tanks per the WAC 173-303 DW regulations. Section 6.0 of the Evaporator IAR is specifically intended to evaluate building secondary containment. 2a • The sump always contains liquid DW and has no ability to detect small leaks which may be mistaken for evaporation [-640(4)(c)(iii)]. 2b • The 1993 Evaporator IAR identified that the Pump Room Sump does not have adequate secondary containment. The procedure for requesting a variance from secondary containment was not followed [-640(4)(h)]. 2c • It's unclear if the Pump Room Sump was inspected for the current Evaporator IAR. The sump is not listed in Appendix C as being fit for use, and there is no inspection report for the Pump Room in Appendix E. Periodic leak testing or other integrity testing is required for the sump [-640(4)(i)(i-iii)].	IQRPE: The Pump Room sump is discussed in several sections of the 2017 IAR. In particular, sections 3.1.2 and 6.1 discuss the Washington Dangerous Waste Permit WA7890008967, Section 4.1.8, "Variances from Secondary Containment Requirements," which allows the Pump Room Sump to have single containment provided certain actions are taken such as rinses. As part of the IQRPE assessment, we confirmed that such rinses do occur. As part of the IQRPE assessment, the IQRPE and several of our subject matter experts (SME's) performed a site observation which included a general observation of the Pump Room. The Pump Room structure and secondary containment is listed on page C-16 of Appendix C as Fit for Use.

3	Sections 2.1.4, 6.4 The integrity of the stainless steel liners in the Drain Sump and the Decon Sump in the Loadout & Hot Equipment Storage Room was not addressed. Only a physical description is provided. Sumps are managed as tanks per the WAC 173-303 DW regulations. Section 6.0 of the Evaporator IAR is specifically intended to evaluate building secondary containment. These sumps have no secondary containment and are not instrumented to detect leaks. It's unclear if the Drain Sump and Decon Sump were even inspected for the current Evaporator IAR as they are not listed in Appendix C as being fit for use, and there is no inspection report for the Loadout & Hot Equipment Storage Room in Appendix E. Integrity of these sumps needs to be addressed in the Evaporator IAR.	IQRPE: The sumps in the Loadout and Hot Equipment Room are secondary containment. These sumps are discussed as secondary containment in Section 6.4 of the IAR. As part of the IQRPE assessment, the IQRPE and several of the SME's performed a site observation which included a general observation of the Loadout and Hot Equipment Room. The Loadout and Hot Equipment Room structure and secondary containment is listed on page C-16 of Appendix C as Fit for Use.
4	Section 2.3 The list of items excluded from the Evaporator IAR says: • Tank farm waste transfer system supernate lines (SN) upstream, slurry lines (SL) and drain lines (DR) downstream of the 242-A Evaporator, including first valved or flanged connection inside facility structure. These lines were included in the 2016 DSTAR. This is not correct. Section 4.0 of the Evaporator portion of the Hanford Sitewide DW Permit (242-A Evaporator OUG, Section 4.0) says the interface with the DST System is at the exterior wall of the 242-A building: "The 242-A Evaporator treatment, storage, and disposal (TSD) unit group boundary for lines running between the 242-A Evaporator and the DST System end at the exterior wall of 242-A building. At this point, these lines (e.g., feed and slurry line piping [SN-269, SN-270, SL-167, and SL-168]) are DST System components." The embedded portions of the feed and slurry lines are part of the Evaporator system, not the DST System. The integrity of the embedded portions was also not addressed in the 2016 DSTAR; that needs to be addressed in the Evaporator IAR.	The remaining portions of the lines were assessed as part of the 2016 DSTAR report. The valved or flanged connection is a practical, easily identified physical interface for assessments. Per RPP-PLAN-57087, 2014, *Double-Shell Tank System Integrity Assessment Plan, Rev. 0*, Section 1.1, PURPOSE AND SCOPE, "Supernatant waste feed pipelines connecting the tank 241-AW-02E feed pump pit and slurry waste concentrate pipelines connecting the 241-AW-A and 241-AW-B valve pits to the 242-A Evaporator facility are included in the integrity assessment." Per RPP-PLAN-60924, 2016, *242-A Evaporator Integrity Assessment Plan*, Rev. 0, Section 3.0, INTEGRITY ASSESSMENT EXCLUSIONS, "Tank Farm Waste Transfer System supernatant lines (SN) upstream, slurry lines (SL), and drain lines downstream of the 242-A Evaporator facility, including first valved or flanged connection inside facility structure. These lines were included in the 2016 DST integrity assessment, RPP-RPT-58441, Rev. 0, *Double-Shell Tank System Integrity Assessment Report (DSTAR)*." The design limitations of the 242-A Evaporator encased dangerous waste piping were identified several decades ago and are recognized in WA 7890008967 Rev. 8C. The parts of the lines that were practical to assess were assessed by either the 2016 DSTAR or the 2017 242-A integrity assessments as noted above.

5	Section 2.1.6 The Evaporator IAR says: **2.1.6 242-A Building Drain Lines** The 242-A Evaporator System operating unit boundary includes the drain lines up to the last valved or flanged connection at the 242-A Evaporator interior wall. Beyond this point, the lines are identified as DST system components. Four lines serve to drain the 242-A Building and equipment to tank AW-102: The above says the embedded portion of the drain lines belongs to the DST System. This is not consistent with the description in the Hanford Sitewide DW Permit, where it says the DST System extends to the exterior wall of the 242-A building (i.e., the embedded lines are part of the Evaporator system). The description in the Evaporator IAR needs to be corrected.	The parts of the lines that were practical to assess were assessed by either the 2016 DSTAR or the 2017 242-A integrity assessments.
6	Sections 7.1, 7.2, 9.1.1.6, 9.2.5, App. C Sections 7.1 and 7.2 talk about how the cathodic protection (on the DST side) of the carbon steel portion of the drain lines DR-334 and DR-335 will extend to the embedded stainless steel portions. The text does not specifically say the lines are protected or sound. What it says is "While these tested locations are not within the evaporator building, they are close enough to the facility to be representative of expected potentials on the drain line piping within the building's foundation." However, later the Evaporator IAR says: **9.1.1.6 Galvanic Corrosion** Based on the relative electrochemical potentials, it is expected the carbon steel should suffer the corrosion being the more anodic alloy. Unfortunately, however, the cathodic protection of the stainless steel by the carbon steel may shift the potential of the stainless steel into a pitting or active corrosion regime. No experimental data for the 242-A Evaporator System are currently available and no method of detection is likely unless a leak occurs. Nonetheless, due to the sturdy construction of the pertinent flanges, no significant galvanic corrosion is anticipated. This indicates the combination stainless/carbon steel drain lines may be subject to galvanic corrosion. The drain lines were not inspected. Please provide the justification for saying the drain lines are "fit for use" in Appendix C (p C-9).	IQRPE: Section 9.1.1.6 is a general section discussing the general theory of galvanic corrosion. As such, Section 9.1.1.6 is not specific to any part of the 242-A. The section quoted is actually from Section 8.2.5.1. As stated, no galvanic corrosion is expected. Sections 7.1 & 7.2: We agree that the text does not explicitly say the lines DR-334 and DR-335 receive cathodic protection from the exterior cathodic protection system, but our assessment is that the pipes DR-334 and DR-335 do receive cathodic protection from the exterior cathodic protection system. The Pump Room sump drain line is DR-334 and is discussed in several sections of the 2017 IAR. In particular, sections 3.1.2 and 6.1 discuss the Washington Dangerous Waste Permit WA7890008967, Section 4.1.8, "Variances from Secondary Containment Requirements," which allows that "No physical revision of the pipe (DR-334) wall penetrations or the floor drains in the evaporator pump room will be required prior to evaporator restart." Additionally, waste with its pH greater than 10 is not a concern for galvanic corrosion of the drain lines. Therefore, Appendix C page C-9 states DR-334 and DR-335 is Fit for Use.
7	Sections 2.3, 5.0, App. C The list of items excluded from the Evaporator IAR says:	It is true that the radiation monitors are discussed in Chapter 4 of the Hanford Sitewide DW Permit; however, information pertaining to these monitors is included as descriptive information. Section 4.1.7 of the permit provides required information pertaining to "secondary containment and release detection for tank systems." There is no discussion of radiation monitors within this section. For

	• Radionuclide and radiation control subsystems as they are outside the scope of the WAC dangerous waste regulations. These include the following: ○ Radiation monitoring or detection components that may be mounted at various locations throughout the system The Evaporator IAR also says in Section 5.0 the steam condensate and raw water systems are not covered by the DW regulations or the Hanford Sitewide DW Permit. This is not correct. The radiation monitors on the process condensate, steam condensate, and used raw water systems are for leak detection. Radiation is an indicator of mixed waste; the alternative is for DOE to provide online chemical analysis for DW constituents. The radiation monitors are identified in the Hanford Sitewide DW Permit. The portions of these systems up to and including the radiation monitors and any associated diversion capability are subject to the DW regulations [WAC 173-303-640(4)]. The process condensate radiation monitor RC-3 is listed as fit for use in Appendix C (p C-8). The basis for saying RC-3 is FFU needs to be stated. Also, the radiation monitors for the steam condensate and used raw water are not listed and need to be addressed.	example, Section 4.1.7.3.3 identifies dangerous waste leak detection associated with the PC-5000 transfer line (the line used to transfer process condensate from the 242-A Evaporator to LERF). There is no discussion of radiation monitors. Instead, dangerous waste system leak detection for PC-5000 is described as single-point electronic leak detection elements or, alternatively, via visual inspection at the encasement catch tank. The radiation monitors are not part of the dangerous waste leak detection system required by WAC 173-303-640(4), and are not required to be included in the dangerous waste tank integrity assessment required by WAC 173-303-640(2). Any concerns regarding radiation monitoring equipment should be addressed through the ongoing permitting process. IQRPE: The R-C-3 and the other radiation monitors are fit for use; however, they are not part of the waste containing boundary. As such, assessment of R-C-3 per WAC 173-303 640(2) was not required to assess the tank system for integrity. So, R-C-3 should not have been listed in Appendix C.
8	Section 2.3 The list of items excluded from the Evaporator IAR says: • System safety features related to personnel safety, fire protection and nuclear criticality safety. This is not correct. Fire control equipment is required by the DW regulations [WAC 173-303-340(1)(c)] and is necessary to ensure the tank systems will not collapse, rupture, or fail. The fire control equipment needs to be addressed in the Evaporator IAR.	It is correct that certain emergency response equipment such as fire control equipment is required at dangerous waste facilities. However, assessment of such equipment is not part of the WAC 173-303-640(2) dangerous waste tank integrity assessment. The dangerous waste integrity assessment requirements apply to a "tank system," defined in WAC 173-303-040 as "a dangerous waste storage or treatment tank and its associated ancillary equipment and containment system." "Ancillary equipment" is defined as "any device including, but not limited to, such devices as piping, fittings flanges, valves, and pumps, that is used to distribute, meter, or control the flow of dangerous waste from its point of generation to a storage or treatment tank(s), between dangerous waste storage and treatment tanks to a point of disposal on-site, or to a point of shipment for disposal off-site." Fire control equipment does not meet the definition of tank, containment system, or ancillary equipment, and is not included as part of the tank system integrity assessment. Neither EPA nor Ecology mention assessing fire control equipment as part of the dangerous waste tank integrity assessment under WAC 173-303-640. E.g., see Chapter 4 of EPA's Technical Resource Document for the Storage and Treatment of Hazardous Waste in Tank Systems and Ecology's Guidance for Assessing and Certifying Tank Systems. Certainly if fire protection equipment was meant to be included as part of the dangerous waste system tank integrity assessment there would have been some mention of it in these detailed guidance

		documents. Any concerns regarding the fire control equipment should be addressed through the ongoing permitting process.
9	Section 4.2.1 The Evaporator IAR references the Evaporator DSA HNF-14755, Section 4.4.3.4.1 and the requirement that functional testing of the C-A-1 vessel seismic dump system must be performed at least once per six months (i.e., 182 days), based on the design life and operating conditions for the C-A-1 Vapor-Liquid Separator system. This functional test needs to be added to the Inspection Plan in the Hanford Sitewide DW Permit (242-A Evaporator OUG, Section 6.2).	The test frequency of the seismic dump system is not based on the design life of the C-A-1 vessel. The test frequency has been made consistent with the test frequencies established for the C-A-1 Vessel Flammable Gas Control System and the C-A-1 Vessel Waste High Level Control System, because all three share common systems.
10	Sections 4.7.3, 5.6.3, 6.8.3, 7.7.3, 8.7.3, 9.3.3, 12.1.4 The Evaporator IAR recommends the next integrity assessment be completed in 15 years. This is not acceptable to Ecology. The current IAR is not complete and is not consistent with previous integrity assessments. There is no justification to increase the frequency of integrity assessments. Rather, the Hanford Sitewide DW Permit for the 242-A Evaporator OUG needs to be modified to require integrity assessments of the Evaporator be performed at a frequency no greater than every 5 years. • The 1993 IAR recommended the next integrity assessment be completed in 5 years (Section 3.1.1). • The 1998 and 2007 IARs recommended the next integrity assessment be completed in 10 years (Section 3.1.2, 3.1.3). • See the e-mail from Ecology HQ (HWTR) which recommends the frequency of Evaporator integrity assessments be established at every 3 years due to aging of the facility and systems, and the materials being processed. Other Ecology DW permits require integrity assessments every 5 years. This is what the DW Regs refer to as "any other relevant factors" [WAC 173-303-640(2)(e)]. • The IQRPE noted it was difficult tracking all the modifications to the Evaporator system since the previous integrity assessment and locating supporting documentation (Section 5.6.3). • Leakage across the reboiler tubes was noted in the 2007 IAR and again in the current IAR, just at levels less than the limit. • The current IAR also notes that the Evaporator was initially constructed for only a 10 year design life. • Other comments have noted that several regulated components of the Evaporator system were not addressed in the current IAR (e.g., leaks from the E-C-1, E-C-2, and E-C-3 Condensers, Pump Room Sump).	IQRPE: On the first two comment bullets, we agree that the 1993, 1998, and 2007 had recommendations for future integrity assessments. This is considered in the report and is extensively discussed in Section 12.1.4.1. On the 3rd comment bullet, we have not received the referenced email, but the age of the system of the system, system materials, waste, and other factors are discussed extensively in Section 12.1.4.2 to .4. Of course, the newest factor in recommending the 15 years is the 4th round of UT data. On the 4th comment bullet, we are currently working on the Single Shell Tank integrity assessment. That report number is RPP-IQRPE-50028, which clearly identifies it as an IQRPE report. We believe this is a positive sign that IQRPE reports will be better tracked for future use. Additionally, while initially difficult, we firmly believe that we received all necessary information to complete the integrity assessment. On the 5th comment bullet, the reported "leakage" does not meet Ecology definition of a leak. We believe the dye testing is error prone in methodology and is questionable whether it actually detected any "leakage" and certainly not accurate enough to determine the level of any leak. As stated in the assessment Section 9.1.4, we feel the radiation detector and boroscope prove there have been no leaks and would provide a better methodology than the dye testing. On the 6th comment bullet, we agree that the initial design life of the 242-A was 10 years, but Section 1.1 states that the facility has undergone life extension upgrades which have extended its original design life. On the 7th comment bullet, the Condensers have been replaced as leaks have occurred. This does not change the overall assessment of 15 years. Regular maintenance is still anticipated over time and that could include replacement of condensers.

		In summary, my recommendation as IQRPE is for the next IAR to be in 15 years as discussed in Section 12.
11	Section 12.1.4.2 The Evaporator IAR says: **12.1.4.2 Age of Tank System** The ages of the 242-A Evaporator System components are listed in several sections of this document. Age is important to determine ERUL. Based on UT data, PNNL report RPP-RPT-59898 estimates the minimum remaining useful life of any part of the 242-A Evaporator as 33 years. Since PNNL did not recognize that the E-C-2 and E-C-3 had been replaced in 2004, this ERUL of 33 years is based on incorrect data that results in an overly conservative corrosion rate. Thus, the actual minimum remaining useful life would be greater than the 33 years listed in that report. The next lowest calculated ERUL in that report is 52 years. The report PNNL report RPP-RPT-59898 has been updated (to Rev 1) since the Evaporator IAR was completed. The PNNL report no longer estimates the minimum remaining useful life at 33 years. And as measurements were taken at only 18 locations, it certainly is not valid to say it addresses "any part of the 242-A Evaporator." The PNNL report specifically cites large uncertainties in the predictions, and notes many instances where trends or data are not sufficient to reliably estimate an uncertainty. One location is identified where the minimum wall thickness is likely to be less than the specified allowable thickness with a probability of approximately 0.78. The estimated remaining useful life is one of the arguments presented in the Evaporator IAR for pushing out the schedule of the next integrity assessment to 15 years. The basis for that is not valid.	IQRPE: The minimum ERUL in the PNNL report RPP-RPT-59898 Rev 1 is now 52 years (Table 5-2). The 2017 Integrity Assessment Report has extensive discussion of the UT data in Sections 9.2 and 12.1.4. The ASME methodology shown in Tables 12-1 and 12-2 provides further evidence that a longer ERUL is justified. Therefore, my recommendation as IQRPE is for the next IAR to be in 15 years is unchanged.
12	Section 5.2 The Evaporator IAR says: All slurry transfer pipelines are encased in a secondary containment pipe and equipped with leak detectors between the primary and encasement piping. The portion of the slurry transfer This is not correct. The slurry lines SL-167 and SL-168 do not have leak detection between the primary pipe and the encasement. Any leaks will drain to the AW-B and AW-A valve pits (respectively), the pits are equipped with leak detectors.	The Section 5.2 paragraph provides a generic description of encasement leak detectors. It could have, but did not, identify that an exception exists for slurry lines SL-168 and SL-167. The AW-A (LDE-207) and AW-B (LDE-208) valve pit leak detectors are utilized to detect leaks on SL-168 and SL-167. The slurry lines and the valve pits are part of the Double-Shell Tank Waste Transfer System.

13

Section 9.2.3, Exec Summary, 4th para

No leak testing was conducted for the E-C-1, E-C-2, and E-C-3 Condensers. Tables 9-1, 9-2, 9-3 of the Evaporator IAR says UT was used to inspect the outer shells of the condensers to assess the structural integrity. This says nothing about the integrity of the tubes inside the condensers and the possibility of leaks to the environment. Section 9.1.4, Leak Detection Methodology, only discusses the stainless steel reboiler and does not even consider leaks from the carbon steel condensers.

Table 3-2 of the Evaporator IAR says a third party inspection of some sort was conducted on the condensers:

Table 3-2: IQRPE Assessment Completed Since 2007 (4 sheets)

TFC-WO-14-(4729-4731) (Rev. 0)	11/24/2014	• Third Party Inspection (E-C-1 Primary Condenser - 4729) • 242-A (E-C-2) Third Party Inspector Inter- Condenser (E-C-2 Inter-Condenser-4730) • Third Party Inspection (E-C-3 After-Condenser-4731)	Primary condenser (E-C-1) Inter-condenser (E-C-2) After-condenser (E-C-3)	The primary condenser (E-C-1), inter-condenser (E-C-2), and after-condenser (E-C-3) was inspected and determined to have sufficient structural integrity and is acceptable for transferring waste.

Similar inspections look to have been performed in 2008 and 2010. Nowhere else in the IAR are these "third party inspections" or is the methodology and results of the inspections discussed. But as Table 3-2 describes these as IQRPE inspections, there must be some sort of documentation with the required certification statement.

13a

- A copy of the work packages TFC-WO-14-4729, -4730, and -4731 was requested from DOE (Paul Hernandez). These appear to be field work packages for third party inspections, and are not stamped and certified by an IQRPE as required.

Some periodic UT inspections were conducted in 1993, 1998, 2007, and 2016 and the data was then statistically evaluated by PNNL. See for example the report RPP-RPT-59898 Rev 1 (PNNL-26203 Rev 1), which included some measurements of the thickness of the outer shell of the condensers. But those say nothing about the leak tightness of the condenser internals.

Integrity assessments are required for existing and new tank system components, including components which are replaced [-640(3)(a,c,h)]. The assessment must consider both structural integrity and leak tightness:

IQRPE: The E-C-1, E-C-2 and E-C-3 condenser tubes are filled with raw cooling water at about 100 psig. If a tube leaked the leakage would flow into tank C-100, not to the environment. Thus there would be no leakage of waste. Condensers have been replaced as leaks (cooling water to process) have occurred. This does not change the overall assessment of 15 years. Regular maintenance is still anticipated over time and that could include replacement of condensers.

WAC 173-303-640 requires that:
(2) Assessment of existing tank system's integrity.
(a) For each existing tank system, the owner or operator must determine that the tank system is not leaking or is unfit for use.
(3)Design and installation of new tank systems or components.
(a) Owners or operators of new tank systems or components must obtain (and for facilities that are pursuing or have obtained a final status permit , submit to the department, at time of submittal of Part B information) a written assessment, reviewed and certified by an independent , qualified registered professional engineer, in accordance with WAC 173-303-810 (13)(a), attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of dangerous waste ...
(e) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use.

13b

- Leak tightness of the system is just as important a part of the integrity assessment as the structural assessment. The leak tightness of the E-C-1, E-C-2, and E-C-3 Condensers must be evaluated as part of the integrity assessment.

14

App. C

Appendix C lists 17 pages of components the IQRPE determined were fit for use. Nearly all of these are pipes and valves (several hundred entries). See the excerpt:

Appendix C
242-A Evaporator Component Fit For Use List

System	Component ID	Description	P & ID Drawing No.	Sheet No.	Grid	Fit For Use (Yes/No)	Comments
Slurry		PIPE	H-2-98999	1		Yes	
	1/4" I-EC1-5-M31	PIPE	H-2-98999	1	B7	Yes	
	1/4" IA-M31	PIPE	H-2-98999	1	F4	Yes	
	1/4" M31	PIPE	H-2-98999	1	D5	Yes	
	3/8" IA-M33	PIPE	H-2-98999	1	C3	Yes	
	1/2" I-EC3-2-M31	PIPE	H-2-98999	1	C2	Yes	
	1/2" PA-M7	PIPE	H-2-98999	1	D6	Yes	
	1/2" SC-M2	PIPE	H-2-98999	1	A6	Yes	
	3/4" DECON-815-M42	PIPE	H-2-98999	1	D4	Yes	
	3/4" DECON-817-M42	PIPE	H-2-98999	1	D7	Yes	
	3/4" PA-756-M7	PIPE	H-2-98999	1	B6	Yes	
	3/4" PA-769-M7	PIPE	H-2-98999	2	D5	Yes	

IQRPE: Appendix C was primarily created from the P & ID drawings that are associated with the primary systems of the 242-A Evaporator. These P & ID drawings are listed in the fourth and fifth columns of Appendix C. While this is consistent with 2007 IAR Attachment 18, Appendix C it probably should have been limited to major equipment. The boundary for assessment was clearly defined and is described in the IAR.

As a Fit for Use list, Appendix C, is primarily to be a reference, so while any discrepancies or typos would not be desirable, the completeness of Appendix C does not change the assessment that the 242-A is Fit for Use.

The IQRPE and SME's and QII walked down the facility, witnessed the leak tests, and reviewed maintenance records and concluded that 242-A was Fit for Use.

Slurry	3/4" SC-M2	PIPE	H-2-98999	1	B7	Yes	
	3/4" SC-M42	PIPE	H-2-98999	1	B6	Yes	
	1" DR-M5	PIPE	H-2-98999	1	C7	Yes	
	1" PC-551-M42	PIPE	H-2-98999	1	B4	Yes	
	1" PC-552-M42	PIPE	H-2-98999	1	B3	Yes	
	1" STM-M2	PIPE	H-2-98999	1	D4	Yes	
	2" M42	PIPE	H-2-98999	1	E5	Yes	
	2-1/2" VAC-1501-M42	PIPE	H-2-98999	1	C5	Yes	
	3" RW-610-M5	PIPE	H-2-98999	1	C6	Yes	
	3" STM-418-M2	PIPE	H-2-98999	1	C5	Yes	
	3" URW-1602-M5	PIPE	H-2-98999	1	B3	Yes	
	3" V-1202-M42	PIPE	H-2-98999	1	D6	Yes	
	3" V-1202-M42	PIPE	H-2-98999	2	D7	Yes	
	3" VAC-1502-M42	PIPE	H-2-98999	1	D6	Yes	
	4" PC-550-M42	PIPE	H-2-98999	1	B7	Yes	
	6" VAC-1500-M42	PIPE	H-2-98999	1	D6	Yes	
	6" VAC-1501-M42	PIPE	H-2-98999	1	D6	Yes	
	12" RW-600-M5	PIPE	H-2-98999	1	B7	Yes	
	12" URW-1600-M5	PIPE	H-2-98999	1	C7	Yes	
	42" VAPOR-1100	PIPE	H-2-98999	1	D7	Yes	
	V3-17	VALVE	H-2-98999	1	B3	Yes	PART OF 3" URW-1602-M5
	V3-18	VALVE	H-2-98999	1	B2	Yes	PART OF 3" URW-1602-M5
	V3-19	VALVE	H-2-98999	1	B2	Yes	PART OF 3" URW-1602-M5
	V3-23	VALVE	H-2-98999	1	C7	Yes	PART OF 4" PC-550-M42
	V3-23A	VALVE	H-2-98999	1	B7	Yes	PART OF 1/4" I-EC1-5-M31
	V3-23B	VALVE	H-2-98999	1	B7	Yes	PART OF 1/4" I-EC1-5-M31
	V4-2	VALVE	H-2-98999	1	E5	Yes	PART OF 2" M42
	V4-3	VALVE	H-2-98999	1	E6	Yes	PART OF 3" VAC-1502-M42
	V4-5	VALVE	H-2-98999	1	B7	Yes	PART OF 3/4" SC-M2
	V4-6	VALVE	H-2-98999	1	B6	Yes	
	V4-9	VALVE	H-2-98999	1	B6	Yes	
	V4-10	VALVE	H-2-98999	1	B6	Yes	
	V4-12	VALVE	H-2-98999	1	B6	Yes	PART OF 3/4" SC-M42
	V4-13	VALVE	H-2-98999	1	A6	Yes	
	V4-13A	VALVE	H-2-98999	1	A6	Yes	
	V4-15	VALVE	H-2-98999	1	A6	Yes	
	V4-16	VALVE	H-2-98999	1	C3	Yes	
	V4-17	VALVE	H-2-98999	1	C3	Yes	

Slurry	V4-19	VALVE	H-2-98999	1	B5	Yes	PART OF 3" STM-418-M2
	V4-20	VALVE	H-2-98999	1	D5	Yes	PART OF 3/4" DECON-815-M42
	V4-23	VALVE	H-2-98999	1	B4	Yes	PART OF 1" PC-552-M42
	V4-24	VALVE	H-2-98999	1	C4	Yes	PART OF 1" PC-551-M42
	V4-25	VALVE	H-2-98999	1	D5	Yes	PART OF 1/4" M31
	V4-27	VALVE	H-2-98999	1	C6	Yes	PART OF 1/2" PA-M7
	V4-28	VALVE	H-2-98999	1	C6	Yes	PART OF 1/2" PA-M7
	V4-30	VALVE	H-2-98999	1	A6	Yes	PART OF 1/2" SC-M2
	V4-18	VALVE	H-2-98999	1	B7	Yes	PART OF 1/4" I-EC1-5-M31
	V4-31	VALVE	H-2-98999	1	C4	Yes	
	V4-31A	VALVE	H-2-98999	1	C4	Yes	PART OF 1/4" IA-M31
	V4-31B	VALVE	H-2-98999	1	C2	Yes	PART OF 1/2" I-EC3-2-M31
	V5-48	VALVE	H-2-98999	1	C7	Yes	
	V5-69	VALVE	H-2-98999	1	D7	Yes	PART OF 3/4" DECON-817-M42
	HV-IA-EC3-1A	VALVE	H-2-98999	1	B3	Yes	PART OF 3/8" IA-M33
	HV-PA-EC2/EC3-2	VALVE	H-2-98999	1	B6	Yes	PART OF 3/4" PA-756-M7
	PT-EC1-5-IA	VALVE	H-2-98999	1	B7	Yes	PART OF 1/4" I-EC1-5-M31
	E-C-1	PRIMARY CONDESNER	H-2-98999	1	C7	Yes	
	E-C-2	INTER CONDENSER	H-2-98999	1	C4	Yes	
	E-C-3	AFTER CONDENSER	H-2-98999	1	B3	Yes	
	SS-C-1	STEAM SEPERATOR	H-2-98999	1	B6	Yes	
	TK-C-500	CORROSION SEPERATOR	H-2-98999	1	B5	Yes	

What is the basis for saying all these pipes and valves are fit for use?

There are many issues with this table when compared to the P&ID H-2-98999. This portion of the table says it is for the Slurry system, but the reference drawing and components listed are for the vacuum condensers, which do not handle slurry. The first item listed in the table has no identifier. The next three items are instrument air lines. Some lines are for raw water or steam. Still, not all the lines and valves are listed. The raw water to E-C-2 is listed (3"RW-610-M5) but not the water to E-C-3 (3"RW-611-M5). The steam supply to the ejectors used to create the vacuum is

	listed, but not the ejectors themselves. The small tank TK-C-500 is labelled on the drawing as Corrosion Inhibitor, but listed in the table as Corrosion Seperator (and misspelled also). While most of the hand valves are shown, many of the control valves and pressure regulators are not listed. Nowhere in the Evaporator IAR does it say these lines or valves were even looked at, or how they were assessed to conclude they are fit for use. Many of the components are outside the scope of the IAR or the permit. It appears the IQRPE simply identified every component on the drawings and made an unsubstantiated statement about each.	
15	<u>Sections 11.2, App. C</u> The reboiler dye test is confusing. The inspection report from 6/28/2017 (1st attempt) says fluorescein dye was injected into the reboiler loop and 5 samples were collected and sent to the 222-S Labs for analysis. Where are those lab results? They wouldn't have been in the results from Southwest Research Institute. After the 1st attempt at the reboiler leak test, there was an Evaporator campaign and then a 2nd leak test was attempted on 8/21/2017. What happened to all the fluorescein dye that was injected for the 1st attempted reboiler leak test? Was it drained back to AW-102, was it evaporated and sent to LERF with the PC, or pumped to the slurry receipt tank? This is not addressed in RPP-PLAN-61365 Rev 0, *242-A Evaporator Facility E-A-1 Reboiler Vessel Integrity Test Plan*. There were several Slurry Side Initial Concentration samples collected (see RPP-RPT-59914 Table 2). Then the test proceeded for 24 hours. Why were there no slurry side <u>final</u> concentration samples collected? The final concentration could then be compared to the initial concentration. This would assuage any questions as to whether the fluorescein dye had degraded or somehow dissipated during the test. Dye was injected in the waste side and samples of the steam condensate collected and analyzed for the presence of dye as an indicator of a leak. The Evaporator IAR says "At the time of this writing, the results from the laboratory have not been returned." Several months after the Evaporator IAR was issued, the lab results were reported in RPP-RPT-59914 Rev 0, *242A Evaporator Facility E-A-1 Reboiler Vessel Integrity Test Report*. Without the leak test results, what was the basis for the IQRPE to say in the Evaporator IAR that the E-A-1 Reboiler is fit for use (p C-3)? This would seem to conflict with the certification statement required by WAC 173-	Southwest Research Institute performed the dye concentration analyses for the Reboiler leak test. The leak test conclusion is reported in RPP-RPT-59914. Questions regarding fate of the fluorescein dye used for the first, aborted test, are not relevant to the integrity assessment. The fluorescein dye test draft report was made available to the IQRPE prior to its eventual publication. IQRPE: In developing these responses to these RCR's, we have recently reviewed the Rev 0 of report RPP-RPT-59914. We believe the dye testing is error prone in methodology. As stated in the assessment Section 9.1.4, we feel the radiation detector and boroscope prove there have been no leaks and would provide a better methodology than the dye testing. Therefore, my recommendation as IQRPE is for the next IAR to be in 15 years is unchanged by the Rev. 0 report RPP-RPT-59914.

	303-810(13)(a) that "...the information submitted is, to the best of my knowledge and belief, true, accurate, and complete." The steam condensate samples were only analyzed for fluorescein dye. No other analyses were performed? Do any of the corrosion inhibitors used in the steam system react with uranine, the active ingredient in fluorescein dye? The dates on the inspection reports IR-291870-004, -005, and -006 alternate between 6/21/2017 and 6/28/2017. The last report has photos showing the collection of steam condensate from the new steam condensate tank and the markup of the work instructions has 8/23/2017 hand written across it.	
16	<u>App. E</u> None of the Inspection Reports are signed.	The inspector's name and the date and time of the inspection are provided for each report. IQRPE: All of the reports were done directly for Meier under the direction of the IQRPE, and as such were reviewed by the IQRPE.
17	<u>Section 4.2.2</u> Referring to the E-A-1 Reboiler, the Evaporator IAR says: The anchorage of the reboiler is not addressed in this report since the vessel and its process loop are not required to perform a safety function during or after a seismic event only inspection. testing. and repair of the vessel and piping are listed in this report. Nothing in the regulations exempts a component from the integrity assessment if it does not perform a safety function during or after a seismic event. What is or is not part of the safety basis is unrelated to the scope of the integrity assessment. WAC 173-303-640 requires that: (2) Assessment of existing tank system's integrity. (c) This assessment must determine that the tank system is adequately designed and has sufficient structural strength and compatibility with the waste(s) to be stored or treated, to ensure that it will not collapse, rupture, or fail. The anchorage of other vessels was addressed in the Evaporator IAR. For example, Figure 4-8 shows a bolt missing that should attach the E-C-1 Condenser to a support beam. Recommendation 60098-02 is to evaluate the existing anchorage of the E-C-1 Condenser to determine its adequacy. The anchorage of the E-A-1 Reboiler must be evaluated as part of the integrity assessment.	IQRPE: The text in section 4.2.2 was misleading. The anchorage of the E-A-1 Reboiler was adequate at the time of construction and was assessed as part of the integrity assessment. Additionally, no evidence of connection concerns was noted in the facility walkdown by the IQRPE and our SME's and our qualified independent inspector (QII).

18	<u>Section 3.3 Table 3-2, 4.2.3, 5.5.1 Table 5-1, 5.6.3, 12.1.3</u> The P-B-1 Recirculation Pump was replaced in November 2007. This pump replacement occurred too late to be captured in the 2007 Evaporator IAR, RPP-RPT-33306 (see Table 1-2, Equipment Upgrade and Replacement-In-Kind History). But the replacement of P-B-1 is also not listed in the 2017 Evaporator IAR in Table 3-2, IQRPE Assessments Completed Since 2007. Please provide the IQRPE integrity assessment for this pump replacement. Table 5-1 lists the reference document WFO-WO-07-3095, which is just the field work package. A like-for-like replacement does not exempt it from requiring an IQRPE integrity assessment in accordance with -640(3)(a,c,h) for installation of new components, and -640(7)(f) for repairs to existing systems. EPA says, new tanks include replacing tank system components (EPA530-K-05-018). As noted in the 2017 Evaporator IAR, Section 5.6.3 and Recommendation 60098-12, a method is needed for tracking all modifications to the Evaporator systems. Per the IQRPE, the tracking system should include IQRPE reports.	The replacement was the refurbished, original pump that had been installed in the facility. The replacement occurred in August, 2008, nearly ten years ago. Pump 88371 had been previously removed from service and refurbished in *ca.* 1996, however preservation maintenance had not been performed, nor was complete documentation of the refurbishment available. Prior to installation, the spare was disassembled and inspected, new upper and lower bearings and seals replaced, and the pump reassembled. The installation was confirmed leak tight during the 242-A cold run in September, 2008 (Work orders WFO-WO-07-3094, *242A Refurbish and Prep Spare PB-1*; WFO-WO-07-3095, *242A Replace PB-1 with Spare*; TFC-WO-08-0925, *242-A, PB-1 Post Maint Testing*; and TFC-WO-08-1307, *242A Perform Leak Checks During Cold/Hot Run 2008*). Since August, 2008, there have been ~ 12.3 million gallons of feed processed through 242-A without any reported leaks or issues with the P-B-1 installation. This was a like-for-like replacement rather than a modification or new unit. According to our IQRPE procedure, TFC-ESHQ-ENV_PP-C-11, REV C-0, the decision to invoke an IQRPE integrity assessment could have gone either way. IQRPE: Since this was a like-for-like replacement, we agree that no IQRPE assessment was required at the time of the pump replacement. For that reason, there is no IQRPE report listed in Table 3-1 since there was no IQRPE assessment. Maintenance records were provided and reviewed as part of the integrity assessment.
19	<u>Missing</u> The 2007 Evaporator IAR included a UT reliability analysis (see the 2007 Evaporator IAR, Section 2.6.3 Reliability of UT Test Data). The UT inspections are limited to certain locations on the components being inspected. The 2007 Evaporator IAR used area extrapolation analysis to estimate the probability that a point located elsewhere on a given unit will be found below the measured data. That analysis is missing from the 2017 Evaporator IAR and needs to be included.	IQRPE: The PNNL report RPP-RPT-59898 Rev 1 was more than adequate for assessment to determine ERUL. Additionally, we performed our own analyses of the UT data to determine ERUL, so the reliability analysis done in the 2007 report was not needed. It should also be noted that we had one more set of UT data than the 2007 report did which greatly increased the confidence level in many of the data points.