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Evaluation of Proposed New LLW Disposal Activity: Disposal of Aqueous PUREX Waste Stream in the Saltstone Disposal Facility

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Summary

The Aqueous PUREX waste stream from Tanks 33 and 35, which have been blended in Tank 34, has been identified for possible processing through the Saltstone Processing Facility for disposal in the Saltstone Disposal Facility. Other options include blending the Aqueous PUREX waste stream with DWPF Recycle waste in Tank 23, blending the Aqueous PUREX waste stream with the solid and liquid material currently in Tank 50, and blending the Aqueous PUREX waste stream with the contents of both Tank 23 and Tank 50. Characterization data from the individual waste streams are used to compare the Saltstone feed material resulting from each option to the disposal limits calculated in the Saltstone Special Analysis.

Of the options considered in this analysis, there is only one case where a radionuclide exceeds the concentration limit on the Special Analysis, ^{14}C in the Tank 33-Tank 35 blend. However, the 0.003 Ci of ^{14}C in this waste stream is only 0.001 of the inventory limit for this radionuclide. The sum of fractions for this waste stream versus the total vault inventory limit for all radionuclides is 0.002.

Each of the four options considered in this analysis meets the disposal requirements set by the Performance Assessment baseline.

Introduction

One intent of DOE Order 435.1[1], as expressed in the performance assessment/composite analysis guidance[2], is to ensure that proposed or discovered changes in wasteforms, containers, radionuclide inventories, facility design, and operations are reviewed to ensure that the assumptions, results, and conclusions of the DOE approved performance assessment (PA), and composite analysis (CA), as well as any Special Analyses (SA) that might have been performed, remain valid (i.e., that the proposed change is bounded by the PA and CA) and the changes are within the bounds of the Disposal Authorization Statement. The goal is to provide flexibility in day-to-day operation and to require those issues with a significant impact on the PA's conclusions, and therefore the projected compliance with performance objectives/measures, to be identified and brought to the proper level of attention. It should be noted that the term performance measure is used to describe site specific adaptations of the DOE Order 435.1 Performance Objectives and requirements (e.g., performance measures such as applying drinking water standards to the groundwater impacts assessment).

The intent of this document is to provide an evaluation to determine if the disposal of the Aqueous PUREX waste stream is within the assumptions, parameters, and bases of the approved SA[3], PA[4] and CA[5]. If it is, then this document serves as the technical basis for authorizing the proposed action. If not, then, according to the SRS Disposal Authorization Statement[6], the PA and CA would need to be updated as appropriate and DOE approval sought of the update (special analysis or revision of the PA or CA).

Description of the Proposed Action

The Aqueous PUREX material in Tank 34, either with or without solid and liquid material in Tank 50 and DWPF Recycle material in Tank 23, has been proposed for processing at the Saltstone Processing Facility and disposal in the Saltstone Disposal Facility.

Background

The Saltstone facility, located in Z-Area, contains a wastewater treatment facility to mix salt waste from the high-level waste tank farms and the Effluent Treatment Facility (ETF) with cementitious solids to form a grout, and a disposal facility to receive the grout into large concrete vaults for disposal as low-level waste (LLW). The Saltstone facility was designed to treat and dispose of decontaminated salt solution produced by the in-tank precipitation process (ITP) and aqueous residues from the ETF. The Saltstone facility began processing radioactive waste in June 1990. Operations continued through August 1998. A total of 2.6 million gallons of salt solution was processed[7]. At that time, the facility was put in standby mode because of difficulties encountered with ITP. Subsequently, it was decided that ITP was unacceptable and other processes were considered. Eventually, an Environmental Impact Statement on Salt Processing Alternatives was published[8]. The Record of Decision (ROD)[9], indicated that Caustic Side Solvent Extraction was the preferred technology for salt decontamination. However, the ROD also indicated that some salt waste may be acceptable for disposal in Saltstone with little pre-treatment.

The performance assessment for the Saltstone disposal facility[4] analyzed the potential impact to public health and the environment from the disposal of the entire amount of ITP salt solution expected. The PA assumed that a total of 7.3×10^8 liters of mixed wastewater (i.e., the "nominal blend" of ITP and ETF wastes) containing the average concentration of radionuclides as listed in Table 2.6-2 of the PA would be disposed in Z-Area. The total inventory of the radionuclides considered in the PA is also stated in the same table. The PA concluded that none of the DOE performance objectives would be exceeded.

DOE Headquarters reviewed the PA. The review resulted in additional information being developed, which was documented in an addendum to the PA[10]. The additional information resulted in modification to the PA results. The revised results also meet all the performance objectives. Therefore, processing and disposal of all of the projected ITP salt solution, blended with ETF waste, will meet all DOE requirements for protection of public health and the environment. Thus, the Waste Acceptance Criteria (WAC) for Saltstone, from the perspective of meeting DOE LLW disposal performance objectives, only needed to restrict the source of the waste being processed and disposed to that arising from ITP and ETF. The PA analysis included one vault cell filled with waste from the Naval Fuels Facility; all of that waste has been emplaced in cell A of vault 4.

SRS is now considering whether salt waste from selected HLW tanks can be transferred to Z-Area for processing and disposal as Saltstone with the only pretreatment being draining of supernate from the solid salt to remove much of the cesium. Such salt waste is termed "low-curie salt (LCS)" waste. A more generalized set of limits than those derived from the Performance Assessment[4] were developed in a Special Analysis.[3] These limits can be used for salt solution arising from a number of processes, as long as the physical and chemical characteristics remain the same as analyzed in the PA.

Supporting Analysis

Characterization data for the Aqueous Purex[11], DWPF Recycle[12] and Tank 50 solids[13] and liquid[14] are given in Table 1.

Waste Stream Characterization

Tables 2 through 5 show concentration of each radionuclide in the inventory and the total curies of each radionuclide compared with the limits derived from the Special Analysis for Aqueous PUREX alone, Aqueous PUREX blended with Tank 50 materials, Aqueous PUREX blended with DWPF Recycle waste, and Aqueous PUREX blended with Tank 50 materials and DWPF Recycle waste, respectively. The ^{14}C concentration in the Aqueous PUREX waste stream exceeds the Special Analysis concentration limit slightly (61 pCi/mL versus 52 pCi/mL). Because the volume of Aqueous PUREX waste is small, this slightly higher concentration is inconsequential in terms of the overall vault inventory limit, which is the fundamental performance assessment-based disposal limit.

Evaluation

1. Does the proposed activity involve a change to the Performance Assessment or exceed PA performance measures/conclusions?

   No. The proposed disposal of the Aqueous PUREX waste stream as Saltstone, with or without the materials from Tank 23 and Tank 50, will not exceed the performance assessment performance measures.

2. Does the proposed activity involve a:

   a. change to the basic disposal concept as described in the PA?

      No. The salt solution waste stream in the proposed activity is to be mixed with cementitious materials per the formulation assumed in the performance assessment and special analysis and disposed into the Saltstone vaults that were analyzed. Therefore, there is no change to the disposal concept described in the PA and SA.

   b. change to the analyses or radionuclide limits as described in the PA?

      No. No change in the radionuclide limits is required for the Aqueous PUREX waste stream.

   c. change in the disposal authorization that leads to a significant change in projected dose?

      No. The proposed action is not, in and of itself, to change the Disposal Authorization Statement.

   d. change in the results in the approved PA that is greater than 10%?

      No. Disposal of the Aqueous PUREX waste stream, with or without Tank 23 and Tank 50 materials, does not change the results of the PA/SA.

   e. change of greater than 10% in the dose calculated in the approved PA?

No. The Aqueous PUREX waste stream is within the limits calculated in the Special Analysis and therefore will not produce a dose greater than that projected on the PA/SA.

f. Does the proposed activity modify the analysis or conclusions provided in the Composite Analysis?

No. The materials proposed for disposal are less than the limits calculated in the Special Analysis, and therefore neither the analysis nor the conclusions of the Composite Analysis would change.

g. change to the Disposal Authorization Statement?

No. The proposed action itself does not involve a change to the Disposal Authorization Statement.

Conclusions

The Aqueous PUREX waste stream, either with or without the DWPF Recycle waste stream or residual waste in Tank 50, is within the envelope of the existing performance basis for disposal as Saltstone. The disposal of the Aqueous PUREX waste stream alone represents a sum of fractions of 0.002 on a vault basis. The disposal of the combination of the Aqueous PUREX waste stream and Tank 50 materials gives a sum of fractions of 0.007. The combination of the Aqueous PUREX and DWPF Recycle waste streams produces a sum of fractions of 0.03. Blending of the Aqueous PUREX waste stream, the DWPF Recycle Waste stream and Tank 50 materials results in a sum of fractions of 0.03.

Table 1. Concentrations and volumes of the waste streams considered

Volume (mL)	2.5E+06	4.5E+07	4.8E+07	3.2E+09	2.3E+08	2.1E+08
Radionuclide	**Tank 33 Aqueous pCi/mL**[11]	**Tank 35 Aqueous pCi/mL**[11]	**Tank 33-35 Mix pCi/mL**	**Tank 23 (100" Sample) pCi/mL**[12]	**Tank 50 Solids pCi/mL**[13]	**Tank 50 Liquid pCi/mL**[14]
H-3	2.1E+04	2.0E+04	2.0E+04	1.5E+03	0.0E+00	9.2E+03
C-14	9.2E+01	5.9E+01	6.1E+01	1.9E+01	0.0E+00	5.3E+01
Al-26				4.7E+00	0.0E+00	0.0E+00
Ni-59	2.0E+01	2.1E+02	2.0E+02	1.2E+00	0.0E+00	1.1E+00
Ni-63	7.7E+01	4.9E+02	4.6E+02	6.6E+00	0.0E+00	9.2E+00
Co-60	9.9E+01	3.3E+01	3.7E+01	5.2E+00	0.0E+00	9.1E-01
Se-79	5.7E+01	2.2E+02	2.1E+02	7.3E+00	0.0E+00	9.0E+00
Sr-90	5.2E+01	8.1E+02	7.7E+02	3.4E+02	1.3E+04	1.7E+01
Nb-94				4.5E+00	0.0E+00	0.0E+00
Tc-99	6.6E+02	1.7E+02	2.0E+02	1.4E+02	0.0E+00	1.1E+03
Ru-106	1.8E+02	1.6E+01	2.5E+01	4.5E+01	0.0E+00	6.6E+00
Sb-125	9.3E+01	1.0E+02	1.0E+02	1.3E+01	5.2E+03	4.6E+01
Sn-126				6.8E+00	0.0E+00	0.0E+00
I-129	2.3E+02	1.5E+01	2.7E+01	6.6E-01	0.0E+00	5.1E+00
Cs-134	6.7E+00	3.2E+00	3.4E+00		0.0E+00	0.0E+00
Cs-137	2.5E+04	1.0E+04	1.1E+04	3.1E+04	1.2E+04	2.5E+03
Eu-152				3.1E+01	0.0E+00	0.0E+00
Eu-154	1.6E+02	1.1E+02	1.2E+02	5.1E+00	0.0E+00	3.4E-01
Eu-155	3.5E+01	2.5E+01	2.6E+01	8.2E+00	0.0E+00	0.0E+00
Ra-226	4.1E+02	2.9E+02	3.0E+02	1.2E+02	0.0E+00	0.0E+00
Ra-228				2.5E+01	0.0E+00	0.0E+00
Ac-227				1.3E+02	0.0E+00	0.0E+00
Th-229					0.0E+00	0.0E+00
Th-230					0.0E+00	0.0E+00
Th-232	2.8E-03	1.4E-03	1.5E-03		1.2E+01	0.0E+00
Pa-231				1.3E+02	0.0E+00	0.0E+00
U-232	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00
U-233	1.1E+02	1.1E+02	1.1E+02		0.0E+00	0.0E+00
U-234	8.7E+01	7.0E+01	7.1E+01		0.0E+00	0.0E+00
U-235	5.1E-01	3.1E-01	3.2E-01		1.1E+02	0.0E+00
U-236	8.6E-01	7.2E-01	7.3E-01		2.1E+02	0.0E+00
U-238	3.3E+01	2.0E+01	2.1E+01		4.9E+03	0.0E+00
Pa-234m/U238	4.1E+01	2.9E+01	2.9E+01		0.0E+00	0.0E+00
Np-237	7.9E+00	7.9E+00	7.9E+00	8.1E+00	0.0E+00	2.1E+00
Np-239	1.5E+02	2.1E+01	2.8E+01		9.7E+03	0.0E+00
Pu-238	5.0E+04	6.8E+03	9.1E+03	2.5E+01	5.5E+02	2.3E+02
Pu-239	8.8E+02	1.3E+02	1.7E+02	5.1E-01	0.0E+00	0.0E+00
Pu-240	2.5E+02	3.3E+01	4.5E+01		0.0E+00	0.0E+00

Table 1. Concentrations and volumes of the waste streams considered

Volume (mL)	2.5E+06	4.5E+07	4.8E+07	3.2E+09	2.3E+08	2.1E+08
Radionuclide	**Tank 33 Aqueous pCi/mL**[11]	**Tank 35 Aqueous pCi/mL**[11]	**Tank 33-35 Mix pCi/mL**	**Tank 23 (100" Sample) pCi/mL**[12]	**Tank 50 Solids pCi/mL**[13]	**Tank 50 Liquid pCi/mL**[14]
Pu-241	1.1E+04	1.3E+03	1.8E+03	3.8E+01	0.0E+00	3.0E+01
Pu-242	4.4E+01	4.4E+01	4.4E+01		0.0E+00	0.0E+00
Pu-244					0.0E+00	0.0E+00
Am-241	1.6E+02	7.0E+02	6.7E+02	1.5E+01	0.0E+00	0.0E+00
Am-242m					0.0E+00	0.0E+00
Am-243	1.5E+02	4.1E+01	4.7E+01		0.0E+00	0.0E+00
Cm-242					0.0E+00	0.0E+00
Cm-243					0.0E+00	0.0E+00
Cm-244	4.1E+03	1.4E+02	3.5E+02		0.0E+00	0.0E+00
Cm-245	1.9E+03	1.9E+03	1.9E+03		0.0E+00	0.0E+00
Cm-246	3.4E+03	3.4E+03	3.4E+03		0.0E+00	0.0E+00
Cm-247					0.0E+00	0.0E+00
Cm-248					0.0E+00	0.0E+00
Bk-249					0.0E+00	0.0E+00
Cf-249					0.0E+00	0.0E+00
Cf-251					0.0E+00	0.0E+00
Cf-252					0.0E+00	0.0E+00

Table 2. Comparison of Aqueous PUREX waste stream to Special Analysis Limits

Radionuclide	Tank 33-35 Mix pCi/mL	SA Limit pCi/mL	Tank 33-35 Mix Ci	Tank 33-35 Fraction of Limit	SA Limit Ci/Vault
H-3	2.0E+04	4.2E+07	9.5E-01	4.5E-07	2.1E+06
C-14	6.1E+01	5.2E+01	2.9E-03	1.1E-03	2.6E+00
Al-26		3.2E+03	0.0E+00	0.0E+00	1.6E+02
Ni-59	2.0E+02		9.6E-03		0.0E+00
Ni-63	4.6E+02		2.2E-02		0.0E+00
Co-60	3.7E+01	6.0E+12	1.7E-03	5.8E-15	3.0E+11
Se-79	2.1E+02	5.3E+03	9.9E-03	3.7E-05	2.7E+02
Sr-90	7.7E+02		3.7E-02		0.0E+00
Nb-94		1.7E+04	0.0E+00	0.0E+00	8.6E+02
Tc-99	2.0E+02	5.5E+05	9.4E-03	3.4E-07	2.8E+04
Ru-106	2.5E+01		1.2E-03		0.0E+00
Sb-125	1.0E+02		4.8E-03		0.0E+00
Sn-126		2.0E+04	0.0E+00	0.0E+00	1.0E+03
I-129	2.7E+01	2.7E+01	1.3E-03	9.3E-04	1.4E+00
Cs-134	3.4E+00		1.6E-04		0.0E+00
Cs-137	1.1E+04	2.0E+10	5.3E-01	5.2E-10	1.0E+09
Eu-152		6.5E+09	0.0E+00	0.0E+00	3.3E+08
Eu-154	1.2E+02	1.5E+11	5.5E-03	7.3E-13	7.6E+09
Eu-155	2.6E+01		1.2E-03		0.0E+00
Ra-226	3.0E+02	9.7E+03	1.4E-02	2.9E-05	4.9E+02
Ra-228		1.8E+11	0.0E+00	0.0E+00	9.1E+09
Ac-227		2.4E+11	0.0E+00	0.0E+00	1.2E+10
Th-229		1.8E+05	0.0E+00	0.0E+00	9.1E+03
Th-230		6.7E+03	0.0E+00	0.0E+00	3.4E+02
Th-232	1.5E-03	3.2E+03	6.9E-08	4.3E-10	1.6E+02
Pa-231		4.0E+05	0.0E+00	0.0E+00	2.0E+04
U-232	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
U-233	1.1E+02	2.8E+05	5.1E-03	3.6E-07	1.4E+04
U-234	7.1E+01	4.1E+03	3.4E-03	1.6E-05	2.1E+02
U-235	3.2E-01	1.8E+06	1.5E-05	1.7E-10	9.1E+04
U-236	7.3E-01		3.5E-05		0.0E+00
U-238	2.1E+01	1.1E+06	9.9E-04	1.8E-08	5.5E+04
Pa-234m/U238	2.9E+01		1.4E-03		0.0E+00
Np-237	7.9E+00	1.4E+05	3.7E-04	5.3E-08	7.1E+03
Np-239	2.8E+01		1.3E-03		0.0E+00
Pu-238	9.1E+03	2.6E+08	4.3E-01	3.3E-08	1.3E+07
Pu-239	1.7E+02	3.6E+11	8.2E-03	4.5E-13	1.8E+10
Pu-240	4.5E+01		2.1E-03		0.0E+00
Pu-241	1.8E+03	1.6E+11	8.6E-02	1.1E-11	8.1E+09

Table 2. Comparison of Aqueous PUREX waste stream to Special Analysis Limits

Radionuclide	Tank 33-35 Mix pCi/mL	SA Limit pCi/mL	Tank 33-35 Mix Ci	Tank 33-35 Fraction of Limit	SA Limit Ci/Vault
Pu-242	4.4E+01		2.1E-03		0.0E+00
Pu-244		7.9E+04	0.0E+00	0.0E+00	4.0E+03
Am-241	6.7E+02	5.0E+09	3.2E-02	1.3E-10	2.5E+08
Am-242m		2.0E+08	0.0E+00	0.0E+00	1.0E+07
Am-243	4.7E+01	5.4E+06	2.2E-03	8.2E-09	2.7E+05
Cm-242		5.2E+10	0.0E+00	0.0E+00	2.6E+09
Cm-243		2.4E+14	0.0E+00	0.0E+00	1.2E+13
Cm-244	3.5E+02		1.7E-02		0.0E+00
Cm-245	1.9E+03	1.3E+08	9.1E-02	1.4E-08	6.6E+06
Cm-246	3.4E+03		1.6E-01		0.0E+00
Cm-247		3.8E+05	0.0E+00	0.0E+00	1.9E+04
Cm-248		9.1E+08	0.0E+00	0.0E+00	4.6E+07
Bk-249		1.2E+09	0.0E+00	0.0E+00	6.0E+07
Cf-249		3.0E+06	0.0E+00	0.0E+00	1.5E+05
Cf-251		4.0E+07	0.0E+00	0.0E+00	2.0E+06
Cf-252		1.2E+14	0.0E+00	0.0E+00	6.0E+12
		Sum of Fractions		2.1E-03	

Table 3. Comparison of Aqueous PUREX waste stream blended with Tank 50 materials with Special Analysis limits

Radionuclide	Tanks 33,35 + Tank 50 All Blend pCi/mL	SA Limit pCi/mL	Tanks 33,35 + Tank 50 All Blend Ci	Tanks 33,35 + Tank 50 All Fraction of Limit	SA Limit Ci/Vault
H-3	5.9E+03	4.2E+07	2.9E+00	1.4E-06	2.1E+06
C-14	2.9E+01	5.2E+01	1.4E-02	5.3E-03	2.6E+00
Al-26	0.0E+00	3.2E+03	0.0E+00	0.0E+00	1.6E+02
Ni-59	2.0E+01		9.9E-03		0.0E+00
Ni-63	4.9E+01		2.4E-02		0.0E+00
Co-60	3.9E+00	6.0E+12	1.9E-03	6.4E-15	3.0E+11
Se-79	2.4E+01	5.3E+03	1.2E-02	4.4E-05	2.7E+02
Sr-90	6.3E+03		3.1E+00		0.0E+00
Nb-94	0.0E+00	1.7E+04	0.0E+00	0.0E+00	8.6E+02
Tc-99	5.0E+02	5.5E+05	2.4E-01	8.8E-06	2.8E+04
Ru-106	5.2E+00		2.6E-03		0.0E+00
Sb-125	2.5E+03		1.2E+00		0.0E+00
Sn-126	0.0E+00	2.0E+04	0.0E+00	0.0E+00	1.0E+03
I-129	4.8E+00	2.7E+01	2.4E-03	1.7E-03	1.4E+00
Cs-134	3.3E-01		1.6E-04		0.0E+00
Cs-137	8.0E+03	2.0E+10	3.9E+00	3.9E-09	1.0E+09
Eu-152	0.0E+00	6.5E+09	0.0E+00	0.0E+00	3.3E+08
Eu-154	1.1E+01	1.5E+11	5.6E-03	7.4E-13	7.6E+09
Eu-155	2.5E+00		1.2E-03		0.0E+00
Ra-226	2.9E+01	9.7E+03	1.4E-02	2.9E-05	4.9E+02
Ra-228	0.0E+00	1.8E+11	0.0E+00	0.0E+00	9.1E+09
Ac-227	0.0E+00	2.4E+11	0.0E+00	0.0E+00	1.2E+10
Th-229	0.0E+00	1.8E+05	0.0E+00	0.0E+00	9.1E+03
Th-230	0.0E+00	6.7E+03	0.0E+00	0.0E+00	3.4E+02
Th-232	5.5E+00	3.2E+03	2.7E-03	1.7E-05	1.6E+02
Pa-231	0.0E+00	4.0E+05	0.0E+00	0.0E+00	2.0E+04
U-232	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
U-233	1.0E+01	2.8E+05	5.1E-03	3.6E-07	1.4E+04
U-234	6.9E+00	4.1E+03	3.4E-03	1.6E-05	2.1E+02
U-235	5.1E+01	1.8E+06	2.5E-02	2.8E-07	9.1E+04
U-236	9.7E+01		4.8E-02		0.0E+00
U-238	2.3E+03	1.1E+06	1.1E+00	2.0E-05	5.5E+04
Pa-234m/U238	2.8E+00		1.4E-03		0.0E+00
Np-237	1.7E+00	1.4E+05	8.2E-04	1.2E-07	7.1E+03
Np-239	4.6E+03		2.3E+00		0.0E+00
Pu-238	1.2E+03	2.6E+08	6.1E-01	4.6E-08	1.3E+07
Pu-239	1.7E+01	3.6E+11	8.2E-03	4.5E-13	1.8E+10
Pu-240	4.3E+00		2.1E-03		0.0E+00

Table 3. Comparison of Aqueous PUREX waste stream blended with Tank 50 materials with Special Analysis limits

Radionuclide	Tanks 33,35 + Tank 50 All Blend pCi/mL	SA Limit pCi/mL	Tanks 33,35 + Tank 50 All Blend Ci	Tanks 33,35 + Tank 50 All Fraction of Limit	SA Limit Ci/Vault
Pu-241	1.9E+02	1.6E+11	9.2E-02	1.1E-11	8.1E+09
Pu-242	4.3E+00		2.1E-03		0.0E+00
Pu-244	0.0E+00	7.9E+04	0.0E+00	0.0E+00	4.0E+03
Am-241	6.5E+01	5.0E+09	3.2E-02	1.3E-10	2.5E+08
Am-242m	0.0E+00	2.0E+08	0.0E+00	0.0E+00	1.0E+07
Am-243	4.5E+00	5.4E+06	2.2E-03	8.2E-09	2.7E+05
Cm-242	0.0E+00	5.2E+10	0.0E+00	0.0E+00	2.6E+09
Cm-243	0.0E+00	2.4E+14	0.0E+00	0.0E+00	1.2E+13
Cm-244	3.4E+01		1.7E-02		0.0E+00
Cm-245	1.9E+02	1.3E+08	9.1E-02	1.4E-08	6.6E+06
Cm-246	3.3E+02		1.6E-01		0.0E+00
Cm-247	0.0E+00	3.8E+05	0.0E+00	0.0E+00	1.9E+04
Cm-248	0.0E+00	9.1E+08	0.0E+00	0.0E+00	4.6E+07
Bk-249	0.0E+00	1.2E+09	0.0E+00	0.0E+00	6.0E+07
Cf-249	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
Cf-251	0.0E+00	4.0E+07	0.0E+00	0.0E+00	2.0E+06
Cf-252	0.0E+00	1.2E+14	0.0E+00	0.0E+00	6.0E+12
		Sum of Fractions		7.2E-03	

Table 4. Comparison of Aqueous PUREX waste stream blended with DWPF Recycle waste stream with Special Analysis limits

Radionuclide	Tanks 23,33,35 Blend pCi/mL	SA Limit pCi/mL	Tanks 23,33,35 Blend Ci	Tanks 23,33,35 Fraction of Limit	SA Limit Ci/Vault
H-3	1.7E+03	4.2E+07	5.6E+00	2.7E-06	2.1E+06
C-14	1.9E+01	5.2E+01	6.3E-02	2.4E-02	2.6E+00
Al-26	4.6E+00	3.2E+03	1.5E-02	9.3E-05	1.6E+02
Ni-59	4.1E+00		1.3E-02		0.0E+00
Ni-63	1.3E+01		4.3E-02		0.0E+00
Co-60	5.7E+00	6.0E+12	1.9E-02	6.1E-14	3.0E+11
Se-79	1.0E+01	5.3E+03	3.3E-02	1.3E-04	2.7E+02
Sr-90	3.5E+02		1.1E+00		0.0E+00
Nb-94	4.4E+00	1.7E+04	1.4E-02	1.7E-05	8.6E+02
Tc-99	1.4E+02	5.5E+05	4.5E-01	1.6E-05	2.8E+04
Ru-106	4.5E+01		1.5E-01		0.0E+00
Sb-125	1.5E+01		4.8E-02		0.0E+00
Sn-126	6.7E+00	2.0E+04	2.2E-02	2.2E-05	1.0E+03
I-129	1.0E+00	2.7E+01	3.4E-03	2.5E-03	1.4E+00
Cs-134	4.9E-02		1.6E-04		0.0E+00
Cs-137	3.1E+04	2.0E+10	1.0E+02	1.0E-07	1.0E+09
Eu-152	3.1E+01	6.5E+09	1.0E-01	3.1E-10	3.3E+08
Eu-154	6.7E+00	1.5E+11	2.2E-02	2.9E-12	7.6E+09
Eu-155	8.5E+00		2.8E-02		0.0E+00
Ra-226	1.3E+02	9.7E+03	4.1E-01	8.4E-04	4.9E+02
Ra-228	2.5E+01	1.8E+11	8.2E-02	9.0E-12	9.1E+09
Ac-227	1.3E+02	2.4E+11	4.2E-01	3.5E-11	1.2E+10
Th-229	0.0E+00	1.8E+05	0.0E+00	0.0E+00	9.1E+03
Th-230	0.0E+00	6.7E+03	0.0E+00	0.0E+00	3.4E+02
Th-232	2.1E-05	3.2E+03	6.9E-08	4.3E-10	1.6E+02
Pa-231	1.3E+02	4.0E+05	4.2E-01	2.1E-05	2.0E+04
U-232	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
U-233	1.6E+00	2.8E+05	5.1E-03	3.6E-07	1.4E+04
U-234	1.0E+00	4.1E+03	3.4E-03	1.6E-05	2.1E+02
U-235	4.6E-03	1.8E+06	1.5E-05	1.7E-10	9.1E+04
U-236	1.1E-02		3.5E-05		0.0E+00
U-238	3.0E-01	1.1E+06	9.9E-04	1.8E-08	5.5E+04
Pa-234m/U238	4.3E-01		1.4E-03		0.0E+00
Np-237	8.1E+00	1.4E+05	2.6E-02	3.7E-06	7.1E+03
Np-239	4.1E-01		1.3E-03		0.0E+00
Pu-238	1.6E+02	2.6E+08	5.1E-01	3.9E-08	1.3E+07
Pu-239	3.0E+00	3.6E+11	9.8E-03	5.4E-13	1.8E+10
Pu-240	6.5E-01		2.1E-03		0.0E+00
Pu-241	6.4E+01	1.6E+11	2.1E-01	2.6E-11	8.1E+09

Table 4. Comparison of Aqueous PUREX waste stream blended with DWPF Recycle waste stream with Special Analysis limits

Radionuclide	Tanks 23,33,35 Blend pCi/mL	SA Limit pCi/mL	Tanks 23,33,35 Blend Ci	Tanks 23,33,35 Fraction of Limit	SA Limit Ci/Vault
Pu-242	6.4E-01		2.1E-03		0.0E+00
Pu-244	0.0E+00	7.9E+04	0.0E+00	0.0E+00	4.0E+03
Am-241	2.5E+01	5.0E+09	8.0E-02	3.2E-10	2.5E+08
Am-242m	0.0E+00	2.0E+08	0.0E+00	0.0E+00	1.0E+07
Am-243	6.8E-01	5.4E+06	2.2E-03	8.2E-09	2.7E+05
Cm-242	0.0E+00	5.2E+10	0.0E+00	0.0E+00	2.6E+09
Cm-243	0.0E+00	2.4E+14	0.0E+00	0.0E+00	1.2E+13
Cm-244	5.1E+00		1.7E-02		0.0E+00
Cm-245	2.8E+01	1.3E+08	9.1E-02	1.4E-08	6.6E+06
Cm-246	5.0E+01		1.6E-01		0.0E+00
Cm-247	0.0E+00	3.8E+05	0.0E+00	0.0E+00	1.9E+04
Cm-248	0.0E+00	9.1E+08	0.0E+00	0.0E+00	4.6E+07
Bk-249	0.0E+00	1.2E+09	0.0E+00	0.0E+00	6.0E+07
Cf-249	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
Cf-251	0.0E+00	4.0E+07	0.0E+00	0.0E+00	2.0E+06
Cf-252	0.0E+00	1.2E+14	0.0E+00	0.0E+00	6.0E+12
		Sum of Fractions		2.8E-02	

Table 5. Comparison of Aqueous PUREX waste stream blended with DWPF Recycle waste stream and Tank 50 materials with Special Analysis limits

Radionuclide	Tanks 23,33,35+ Tank 50 All Blend pCi/mL	SA Limit pCi/mL	Tanks 23,33,35+ Tank 50 All Blend Ci	Tanks 23,33,35+ Tank 50 All Fraction of Limit	SA Limit Ci/Vault
H-3	2.0E+03	4.2E+07	7.6E+00	3.6E-06	2.1E+06
C-14	2.0E+01	5.2E+01	7.4E-02	2.8E-02	2.6E+00
Al-26	4.1E+00	3.2E+03	1.5E-02	9.3E-05	1.6E+02
Ni-59	3.7E+00		1.4E-02		0.0E+00
Ni-63	1.2E+01		4.5E-02		0.0E+00
Co-60	5.1E+00	6.0E+12	1.9E-02	6.2E-14	3.0E+11
Se-79	9.5E+00	5.3E+03	3.5E-02	1.3E-04	2.7E+02
Sr-90	1.1E+03		4.2E+00		0.0E+00
Nb-94	3.9E+00	1.7E+04	1.4E-02	1.7E-05	8.6E+02
Tc-99	1.9E+02	5.5E+05	6.9E-01	2.5E-05	2.8E+04
Ru-106	4.0E+01		1.5E-01		0.0E+00
Sb-125	3.4E+02		1.3E+00		0.0E+00
Sn-126	5.9E+00	2.0E+04	2.2E-02	2.2E-05	1.0E+03
I-129	1.2E+00	2.7E+01	4.5E-03	3.3E-03	1.4E+00
Cs-134	4.3E-02		1.6E-04		0.0E+00
Cs-137	2.8E+04	2.0E+10	1.0E+02	1.0E-07	1.0E+09
Eu-152	2.7E+01	6.5E+09	1.0E-01	3.1E-10	3.3E+08
Eu-154	6.0E+00	1.5E+11	2.2E-02	2.9E-12	7.6E+09
Eu-155	7.4E+00		2.8E-02		0.0E+00
Ra-226	1.1E+02	9.7E+03	4.1E-01	8.4E-04	4.9E+02
Ra-228	2.2E+01	1.8E+11	8.2E-02	9.0E-12	9.1E+09
Ac-227	1.1E+02	2.4E+11	4.2E-01	3.5E-11	1.2E+10
Th-229	0.0E+00	1.8E+05	0.0E+00	0.0E+00	9.1E+03
Th-230	0.0E+00	6.7E+03	0.0E+00	0.0E+00	3.4E+02
Th-232	7.3E-01	3.2E+03	2.7E-03	1.7E-05	1.6E+02
Pa-231	1.1E+02	4.0E+05	4.2E-01	2.1E-05	2.0E+04
U-232	0.0E+00	3.0E+06	0.0E-00	0.0E-00	1.5E+05
U-233	1.4E+00	2.8E+05	5.1E-03	3.6E-07	1.4E+04
U-234	9.1E-01	4.1E+03	3.4E-03	1.6E-05	2.1E+02
U-235	6.8E+00	1.8E+06	2.5E-02	2.8E-07	9.1E+04
U-236	1.3E+01		4.8E-02		0.0E+00
U-238	3.1E+02	1.1E+06	1.1E+00	2.0E-05	5.5E+04
Pa-234m/U238	3.8E-01		1.4E-03		0.0E+00
Np-237	7.2E+00	1.4E+05	2.7E-02	3.8E-06	7.1E+03
Np-239	6.1E+02		2.3E+00		0.0E+00
Pu-238	1.9E+02	2.6E+08	6.9E-01	5.2E-08	1.3E+07
Pu-239	2.7E+00	3.6E+11	9.8E-03	5.4E-13	1.8E+10
Pu-240	5.7E-01		2.1E-03		0.0E+00

Table 5. Comparison of Aqueous PUREX waste stream blended with DWPF Recycle waste stream and Tank 50 materials with Special Analysis limits

Radionuclide	Tanks 23,33,35+ Tank 50 All Blend pCi/mL	SA Limit pCi/mL	Tanks 23,33,35+ Tank 50 All Blend Ci	Tanks 23,33,35+ Tank 50 All Fraction of Limit	SA Limit Ci/Vault
Pu-241	5.8E+01	1.6E+11	2.2E-01	2.7E-11	8.1E+09
Pu-242	5.6E-01		2.1E-03		0.0E+00
Pu-244	0.0E+00	7.9E+04	0.0E+00	0.0E+00	4.0E+03
Am-241	2.2E+01	5.0E+09	8.0E-02	3.2E-10	2.5E+08
Am-242m	0.0E+00	2.0E+08	0.0E+00	0.0E+00	1.0E+07
Am-243	6.0E-01	5.4E+06	2.2E-03	8.2E-09	2.7E+05
Cm-242	0.0E+00	5.2E+10	0.0E+00	0.0E+00	2.6E+09
Cm-243	0.0E+00	2.4E+14	0.0E+00	0.0E+00	1.2E+13
Cm-244	4.5E+00		1.7E-02		0.0E+00
Cm-245	2.5E+01	1.3E+08	9.1E-02	1.4E-08	6.6E+06
Cm-246	4.4E+01		1.6E-01		0.0E+00
Cm-247	0.0E+00	3.8E+05	0.0E+00	0.0E+00	1.9E+04
Cm-248	0.0E+00	9.1E+08	0.0E+00	0.0E+00	4.6E+07
Bk-249	0.0E+00	1.2E+09	0.0E+00	0.0E+00	6.0E+07
Cf-249	0.0E+00	3.0E+06	0.0E+00	0.0E+00	1.5E+05
Cf-251	0.0E+00	4.0E+07	0.0E+00	0.0E+00	2.0E+06
Cf-252	0.0E+00	1.2E+14	0.0E+00	0.0E+00	6.0E+12
		Sum of Fractions		3.3E-02	

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