Safety Evaluation Report for Certificate of Compliance No. 9979 Amendment for the Model 9979 Package

Dockets No. 23-11-9979

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This Safety Evaluation Report (SER) documents the U.S. Department of Energy (DOE) Packaging Certification Program (PCP) independent review and confirmatory analysis of the Safety Analysis Report for Packaging (SARP) supplement prepared by the Savannah River National Laboratory (SRNL) on behalf of the DOE Savannah River Operations Office (SR) for amendment of DOE Certificate of Compliance (CoC) Number 9979 for the Model 9979 package design.

Summary

By memorandum [1] dated December 8, 2022, as supplemented February 13, 2023, May 8, 2023, August 8, 2023, and January 11, 2024 [2-6, 7-13], the DOE CoC 9979 certificate holder, SR, requested an amendment to the CoC to correct the calculated administrative mass limits in Table 2 of the CoC (SARP Table 1.2) for certain radioisotopes in highly enriched uranium (HEU) waste to limit the radiation level at the external surface of the package to below 200 mrem/hr., and to clarify the basis for the mass limits of the remaining radioisotopes.

The changes in CoC Revision 18 are limited to Table 2, *HEU, TRISO Fuel and Process Materials*, to clarify when the content radioisotope mass limits are based on the most restrictive limit of:

a. External radiation,
b. One A_2,
c. Fissile mass, or
d. Payload mass.

The CoC Table 2 mass limits based on package radiation are only administrative controls intended to keep the package below the external radiation limits in § 71.47(a) for non-exclusive use shipment. The package radiation-based mass limits in CoC Table 2 may be exceeded only if:

a. Package and shipment radiation levels meet § 71.47(b) for exclusive use transport,
b. Package decay heat does not exceed 9.12E-3 watts,
c. Package A_2, fissile, and payload mass limits are all met, and
d. Shipment complies with § 71.47(c) and (d).

The applicant submitted a supplement to SARP Rev 7 and its supplement for Docket 21-03-9979, Chapters 1 and 5, with a new shielding (i.e., radiation) calculation as the safety basis documents for the CoC amendment. There are no changes to the drawings, design features, operating, and maintenance procedures of the packaging.

Based on the statements and representations in the SARP supplement for Docket 23-11-9979 and its supporting shielding calculation, and conditions listed in this SER, DOE PCP staff independently confirmed by document review and confirmatory analysis that the package meets the requirements of 10 CFR Part 71 and recommends amendment of the CoC by the DOE Headquarters Certifying Official (HCO).

Evaluation

The purpose of this evaluation is to verify that the revised content mass limits based on package radiation level are sufficiently accurate administrative controls for package users to meet § 71.47(a). This evaluation documents DOE PCP staff's review of these changes as implemented in the supplement to SARP Chapters 1 and 5 and its supporting new shielding calculation.

Staff notes that the 9979 packaging design does not incorporate, or require, any specific packaging design features for radiation shielding to meet § 71.47, *External radiation standards for all packages*.

Furthermore, it is sufficient [15] for an applicant (SARP preparer) and package user to demonstrate compliance with § 71.47 for a Type A (and Type A fissile) package design by radiation measurement prior to shipment in lieu of additional shielding calculations and analysis required for Type B (and Type B fissile) package designs per § 71.51, *Additional requirements for Type B packages*. Consequently, content mass limits in this application based on package radiation are only administrative controls for package users to meet § 71.47(a). Users may exceed the radiation-based mass limits in SARP Table 1.2 for the package only if the package meets the actual content limits for: A_2 for the mixture, fissile mass, payload mass, and decay heat limit (for gas generation), and comply with all other requirements in § 71.47 for the package and shipment.

The correction to the radiation-based mass limits in SARP Rev 7 and CoC Rev 17 is necessary because the applicant discovered they omitted an important assumption in the SARP Chapter 5, Shielding Evaluation used in the shielding analyst's model and calculation for determining these limits. The analyst's model assumed each radioisotope was embedded in 350 grams of U-235, which provided a measure of shielding of the radioisotope. This assumption was not included as a condition in the SARP or CoC; consequently, for HEU contents with less than 350 grams of U-235, the radiation-based mass limits are overstated because there is less uranium shielding. This omission could lead a user to plan and prepare a package for non-exclusive use shipment only to discover after measuring the package dose rate prior to shipment that the package would not meet §71.47(a). To correct this omission, the applicant's shielding analyst calculated new radiation-based mass limits in a model of each radioisotope embedded in 15 grams of U-235. Fifteen grams of U-235 was selected by the applicant for analysis for the source model based on consultation with Y-12 on their minimum mass of uranium shipped in 9979 packages to the Nevada National Security Site for disposal.

The safety basis for CoC Revision 17 is SARP Rev 7 and its Supplement for Docket 21-03-9979 (CoC Section 5(e)(1)), which will henceforth be referred to in this SER are the "SARP" unless otherwise specified. The applicant revised Chapters 1 & 5 of the supplement and submitted these chapters as the SARP Supplement for Docket 23-11-9979, which will henceforth be referred to in this SER as the "SARP Supplement", unless otherwise specified.

Evaluation of SARP Supplement Chapter 1

Chapter 1 of the SARP Supplement for Docket 23-11-9979 [14] implements changes to:

1. Accept the track changes in the SARP Supplement for Docket 21-03-9979,
2. Correct the calculated transport index from 0.7 to 0.8 for Table 1.2 contents,
3. Clarify Section 1.2.2.1 that the maximum U-235 mass for Table 1.2 is 350 grams,
4. Update Table 1.2 *–Envelope Limits including Highly Enriched Uranium (HEU) Content* and its *Table Notes* to show mass limits based on shielding (that is, radiation), A_2, fissile, or payload, and
5. Add Co-60 to the list of authorized Table 1.2 contents.

DOE PCP staff notes that Section 1.2.2.2 of the SARP and SARP supplements prohibit "visible liquids" in the contents, that is, no free liquids. This prohibition is easily verified by visual inspection and consistent with the waste acceptance criteria (Nevada National Security Sites Waste Acceptance Criteria, DOE/NV--325-24-00, February 2024), where many 9979 packages are sent for disposal. In addition, this section also includes a limit on moisture content, "Moisture within the payload is limited to a maximum of one weight percent" but does not provide a regulatory or waste acceptance basis for this limit. This prohibition is impractical to verify and inconsistent with waste acceptance criteria. The applicant does evaluate the effects of 2 lb. of residual, free liquid (water) in the contents for pressure and flammable gas generation to demonstrate the safety performance of the package is not affected by residual liquid. In addition, the nuclear criticality safety evaluation in Section 6.3.7 of the SARP evaluates dry and flooded conditions for a single package and an array of packages under normal and accident conditions to demonstrate compliance with §§71.55 and 71.59; consequently, a moisture content limit is not a condition for nuclear criticality safety. Staff concludes that the prohibition on free liquids and demonstration that 2 lb. of residual free liquids do not affect the performance of the package are sufficient to delete the limit on moisture content in the CoC.

Based on a review of the statements and representations in Chapter 1 of the SARP Supplement for Docket 23-11-9979, Rev 1, DOE PCP staff concludes that the content changes in support of the CoC amendment request have been described in sufficient detail to provide an adequate basis for the package evaluation under 10 CFR Part 71.

Evaluation of SARP Supplement Chapter 5 and its Shielding Calculation

Chapter 5 of the SARP Supplement for Docket 23-11-9979 [14] implements changes to the following sections based on the changes to the Table 1.2 contents and its shielding calculation, N-CLC-A-00108, Revision 1 [11]:

1. Accept track changes in the SARP Supplement for Docket 21-03-9979,
2. Update the Preface text, 2nd para, to describe Content Tables 1.2 and 1.3 removed from Table 5-1, *Summary Table of External Radiation Levels (Non-Exclusive Use) for Content Table 1.4.* (new table caption)
3. Section 5.1.2 - para revised for clarity,
4. Section 5.1.2.1 – revised to describe the overall method for determining the Table 1.2 mass limits based on external radiation for non-exclusive use shipment, and state that the Table 1.2 limits are bounding for Table 1.3 for U-235 and U-238. And the

estimated TI for Table 1.2 is 0.8 and 0.7 for Table 1.3,

5. Section 5.1.2.2 – revised to clarify that Table 5-1 only applies to Table 1.4 Contents,
6. Section 5.2.1 – revised to describe how the source term was developed for the Table 1.2 contents and consolidated Tables 5-4 and 5-5 in an updated Table 5-4 with the new mass limits, including Co-60 (added). The subsequent tables and references in the text are renumbered to reflect the changes, beginning in Section 5.2.2,
7. Section 5.2.4.1 – revised to reference the new calculation, N-CLC-A-00108, Revision 1, for the neutron and photon source spectra and strengths for the Table 1.2 contents,
8. Section 5.3.1.1 – revised to describe the new shielding model and reference the analysis in N-CLC-A-00108, Revision 1,
9. Section 5.4.1.1 – revised to describe the new shielding evaluation of the Table 1.2 contents, including the codes and standards,
10. Section 5.4.4.1- revised to describe how the external radiation levels for Table 1.2 were calculated in N-CLC-A-00108, Revision 1, as shown in Table 5-21,
11. Section 5.6 – references updated:
    a. References 6 through 9, 12, and 19 through 26 deleted (superseded by N-CLC-A-00108, Revision 1),
    b. Reference 13 replaced N-CLC-A-00101, Revision 1 by N-CLC-A-00108, Revision 1,
    c. Reference 14 added “reserved”, and
    d. References 15 through 18 renumbered from references 14 through 17.

The applicant performed a shielding analysis of the SARP Supplement for Docket 23-11-9979, Table 1.2 contents with a minimum uranium mass limit of 15 grams, as documented in N-CLC-A-00108 Rev. 0.[4] In addition, the applicant performed a chapter-by-chapter assessment [5] of these changes to the SARP to demonstrate only Chapters 1 and 5 were affected.

DOE PCP staff reviewed N-CLC-A-00108 Rev. 0 and performed a confirmatory analysis. Staff found that the applicant’s radiation-based mass limits were conservative and acceptable; however, the applicant had transposition errors in Tables 6.9 and 6.10 of the calculation for allowable A_2 mass limits for Am-241, Cm-243 and Co-60.[7]

The applicant submitted N-CLC-A-00108, Rev. 1, to correct the transposition errors and provide additional clarification on their method of analysis. The applicant also updated their chapter-by-chapter assessment of these changes to the SARP.[12] The applicant subsequently provided email clarification on October 10, 2023, [16] that demonstrates how N-CLC-A-00108, Rev. 1, supersedes both N-CLC-A-00101, Rev. 1, and N-CLC-A00132, Rev 1, as the radiation-based mass limits for Table 1.2 in SARP Rev 7, Appendix 5.4 and 5.1 respectively and SARP Supplement for Docket 21-03-9979, References 13 and 12 respectively. The email also addresses DOE PCP staff’s comments on the calculated mass limits for radioisotopes Co-60, Cs-137, Sr-90, Th-228, Th-229, and U-232. This clarification qualitatively demonstrated that the calculated radiation-based mass limits would be greater in the 350-gram uranium case than the 15-gram case, due to increased self-shielding from the uranium and the greater distance of the

isotope source center to the package surface.

DOE PCP staff performed a confirmatory shielding analysis for comparison.

Package Model for Shielding Analysis

There were no changes to the packaging, which is sufficiently described in the SARP Supplement. The packaging design does not include any specific design feature for radiation shielding. The package model for the applicant's shielding analysis is simplified as it consists of two concentric cylindrical vessels to represent the 30-gallon and 55-gallon drums. The 30-gallon drum is modeled with a cylinder with diameter of 19 inches and height of 29 inches and the 50-gallon drum is modeled with a cylinder with diameter of 23.5 inches and height of 34.25 inches. The wall thickness of both drums is modeled as 0.12 cm thick. The volume between the drums is modeled as filled with polyurethane foam. This model does not include structures such as the lid closure devices or drum rolling hoops. There is no significant damage to the package under normal conditions of transport (NCT). Under NCT, the package integrity is maintained throughout its intended operation. Since the package is limited to a Type A quantity of radioactive material, a shielding evaluation in accordance with § 71.51 under hypothetical accident conditions (HAC) is not required.

Source Specification

The photon and neutron source terms were calculated by decaying 1 gram of each radioisotope in SARP Table 1.2. One weight percent of beryllium was included in the source term calculations to consider the contribution from (alpha, n) reactions. Due to the potential existence of UF_6, the calculated neutron and secondary photon dose for all radioisotopes are conservatively multiplied by 2.0. U-235 is chosen to represent all uranium radioisotopes to maximize the subcritical multiplication of neutrons. For photon transport, radioisotopes of uranium have no impact. Isotopic source terms were decayed in ORIGEN-S for up to 80 years to generate a bounding photon and neutron emission spectrum. Due to natural decay and in-growth of radionuclide daughters, emission intensities within an energy bin can fluctuate over time. Bounding source spectra were constructed using the maximum intensities found in each energy group across the entire 80-year decay period. The neutron source strength is reduced by the presence of oxygen which competes with the beryllium for (alpha, n) interactions. The photon source strength remains the same since alpha interactions with the target nuclei do not produce significant photon sources. The original neutron sources (without oxygen) were used as a conservative source in the oxide shielding analysis cases.

Shielding Analysis Results

The Monte Carlo N-Particle Transport Code (MCNP, Versions 6.1 and 6.2), ENDF/B-VII cross sections, and the ANSI/ANS-6.1.1-1977 recommended neutron and gamma flux-to-dose-rate conversion factors were used by the applicant in their shielding calculation and DOE PCP staff in their confirmatory analyses.

The radioisotopes analyzed were modeled by distributing their respective source terms uniformly within a sphere of 15 gram sphere of U-235 in metal or oxide form. The volume,

radius, and position for metal or oxide spheres are shown in Table 5-2 of N-CLC-A-00108, Rev 1. The source was modeled at the inner side and at inner top side of 30-gallon drum, for the dose rates at the side and top of the package, respectively. The dose rate was not calculated at the bottom of the package since the model is symmetrical vertically.

The radiation-based mass limit for each isotope is estimated using the following equation with 190 mrem/h at the surface of the package as the upper bound of the package surface dose rate, which is below the § 71.47(a) limit of 200 mrem/h with a margin:

$$M_i = \frac{190\ mrem/h - 15 \times D_{235}}{D_i}$$

Where,

M_i is the allowable mass of isotope "i" embedded in 15 grams of U-235,
D_{235} is the specific dose rate of U-235 (mrem/h/g),
D_i is the specific dose rate of radioisotope "i" (mrem/h/g)

SER Table 1 below shows the calculated mass limit for each radioisotope based on its dose-rate for non-exclusive use shipment, and its A_2 limit for a Type A package. The fissile mass limit of 350 g for U-235 based on the SARP criticality evaluation, is unchanged. Other fissile radioisotopes are accounted for by their U-235-equivalent mass as shown by the equation in Table 2, Table note "a" of the CoC. The 90,000 g mass limit for Th-232 and U-238 based on the package mass limit from SARP structural evaluation, are likewise unchanged. The shaded cells in Table 1 below are the maximum allowed radioisotope mass limits given the criteria above and a minimum of 15 g of uranium metal or oxide.

Table 1 Comparison of Applicant and DOE PCP Staff's Calculated Maximum Mass Limits for the Radioisotopes Listed in SARP Supplement Table 1.2

Radioisotope	Radiation-based limit for non-exclusive use (g)		A_2-based limit(g)	SARP Table 1.2	
	SARP Supplement	Staff		Current Limit (g)	New Limit (g)
Am-241	5.94E-01	9.75E-01	7.69E-03	7.69E-03	7.69E-03
Cm-243	1.04E-03	2.48E-03	5.26E-04	5.19E-04	5.26E-04
Co-60	7.44E-07	7.45E-07	9.52E-03	-	7.44E-07
Cs-137	4.72E-05	4.82E-05	1.88E-01	2.30E-05	4.72E-05
Eu-155	4.46E-04	1.84E-03	1.67E-01	1.10E-03	4.46E-04
Np-237	2.87E+01	4.17E+01	7.69E+01	7.69E+01	2.87E+01
Pu-238	2.14E-01	2.31E-01	1.59E-03	1.58E-03	1.59E-03
Pu-239	7.12E+01	7.39E+01	4.35E-01	4.35E-01	4.35E-01
Pu-240	1.91E+01	1.96E+01	1.19E-01	1.19E-01	1.19E-01
Pu-241	6.50E-01	1.08E+00	1.58E-02	1.58E-02	1.58E-02
Sr-90	5.07E-04	6.27E-04	5.88E-02	3.09E-04	5.07E-04
Tc-99	1.87E+03	6.77E+03	1.43E+03	1.428E+03	1.43E+03
Th-228	2.22E-06	3.37E-06	3.33E-05	7.15E-07	2.22E-06
Th-229	6.00E-02	8.48E-02	6.33E-02	3.17E-02	6.00E-02
Th-230	1.57E+00	1.71E+00	1.32E+00	5.42E-01	1.32E+00
Th-232	9.68E+03	1.06E+04	Unlimited	9.00E+04	9.68E+03
U-232	8.75E-05	9.60E-05	1.20E-03	5.00E-05	8.75E-05

U-233	1.12E+02	1.48E+02	1.67E+01	1.66E+01	1.67E+01
U-234	9.03E+02	1.00E+03	2.61E+01	2.61E+01	2.61E+01
U-235	2.01E+04	6.93E+04	Unlimited	3.50E+02	3.50E+02
U-236	1.18E+05	1.17E+05	2.50E+03	2.50E+03	2.50E+03
U-238	1.52E+05	1.73E+05	Unlimited	9.00E+04	9.00E+04

For a mixture of radioisotopes in Table 1 above, the sum-of-the-fraction methodology is used to estimate the radiation-based mass limit for non-exclusive use shipment of the package:

$$\sum \frac{m_i}{M_i} \leq 1$$

Where,

m_i is the actual mass of isotope "i",
M_i is the radiation-based mass limit of isotope "i" from Table 1

DOE PCP staff confirmed the applicant's estimated radiation-based mass limits are sufficiently accurate to prepare a package for non-exclusive use shipment per § 71.47(a).

Based on review of the statements and representations in the SARP Chapter 5 supplement for Docket 23-11-9979 and DOE PCP staff's confirmatory analysis, staff has reasonable assurance that the package design has been adequately described and evaluated and that the package meets the external radiation requirements of 10 CFR 71.47.

Evaluation of SARP Supplement Impact of Changes

DOE PCP staff reviewed the applicant's chapter-by-chapter impact evaluation and concurs the changes and clarifications to the radioisotope mass limits in SARP Supplement for Docket 23-11-9979, Table 1.2, does not affect the structural, thermal, containment, and nuclear criticality safety evaluations, or package operation procedures, acceptance testing and maintenance, and quality assurance program for the package in the SARP and its supplement for Docket 21-03-9979.

The SARP structural evaluation of the package remains valid because the package content mass limit of 90,000 g is unchanged.

DOE PCP staff confirmed by calculation that the decay heat for the proposed radioisotope mass limits for Table 1.2, with each radioisotope at its package mass limit, would not exceed 3.71E-02 watt, including the addition of Co-60, and is therefore bounded by the 4.49E-02 watt calculated heat load in Appendix 4.1 of the SARP for the existing Table 1.2 contents, and CoC package limit of 3.5 watts. Staff also confirmed by calculation that the maximum decay heat for the proposed Table 1.2 contents, consisting of an A_2 mixture of the highest specific-heat radioisotopes for liberating hydrogen, is approximately 7.68E-03 watt, which is below the CoC limit of 9.12 E-03 watt and basis for the hydrogen gas generation rate calculation for Table 1.2 contents, as documented in M-CLC-A-00631, Revision 4 (SARP Supplement for Docket 21-03-9979, Section 3.6, Reference 31). Therefore, the SARP thermal evaluation and gas generation limits remain valid for proposed SARP Table 1.2 contents. Staff noted an error in M-CLC-A-00631 regarding the specific heat used for Tc-99: this calculation uses 5.6E-06

(Watt/gram) instead of 1.02E-05 from Reference 4 of the calculation. The Tc-99 mass (1.43E+03 g) assumed in this calculation as the decay heat input assumption for gas generation is significantly greater than is offered for shipment in the package with Table 1.2 contents, since Tc-99 is a small constituent in HEU waste (micrograms-milligram per gram of uranium). Staff concurs that the decay heat input of 9.12E-03, with the error for Tc-99, remains sufficient for the gas generation calculation.

DOE PCP staff confirmed by document review that the SARP containment and nuclear criticality safety evaluations are not affected by the proposed changes to Table 1.2, since the package is limited to a Type A quantity of radioactive material and the package maximum fissile mass limit of 350 g of U-235 or U-235 equivalent are unchanged.

Finally, DOE PCP staff confirmed by document review that the changes in the SARP Supplement do not affect the package operations procedures, acceptance tests and maintenance program, and the QA program for the package since there were no packaging changes.

Conditions of Approval

The following changes to CoC 9979 Rev 17 are required to implement the SARP Supplement for Docket 23-11-9979 evaluated in this SER.

- Section 5(a)(2), Description: Revise 2nd paragraph from "silicon" to "silicone" (correction)
- Section 5(b)(1), Type and form of material: Revise 3rd paragraph to "…defined in Tables 2-1 through 2-6 of N-NCS-G-00174, Revision 1 (SARP Section 6.10, Reference 3)." (added SARP reference)
- Section 5(b)(2), Maximum quantity of material per package:
  - Revise the text for Table 2, to add "… The mass limit for each radioisotope in Table 2 is based on the most restrictive of:
    - External radiation to meet 10 CFR 71.47(a) with a minimum of 15 grams of uranium metal or oxide,
    - A2 mass (A2/Specific Activity from 49 CFR 173.435),
    - U-235 fissile gram equivalent limits based on impurities listed in the table (Limits from SARP, Section 6.10, Reference 4, N-NCS-A-00019 Rev 2),
    - Package content mass limit of 90 kg (200 lb.). "Table 2 defines the limits for Highly Enriched Uranium (HEU) including TRISO fuel and process materials." (implement SARP Supplement)
  - Replace update Table 2 with data from SARP Supplement Table 1.2
  - Replace Table 2 footnotes with Table 2 Notes from SARP Supplement Table 1.2.
- Section 5(b)(3), Maximum Decay Heat: Revise from "9.12E-3 watts" to "9.12E-03 watts" (correction)
- Delete Section 5(b)(4), Maximum Moisture Content: There is no regulatory requirement or waste acceptance criteria for this limit: "The contents shall not exceed one weight percent moisture." (CoC prohibition on free liquids is sufficient)

- Section 5(d), Conditions:
  - (1) – Replace "visible liquids" with "free liquids (means liquids which readily separate from the solid portion of a waste/contents under ambient temperature and pressure)" (clarification)
  - (8) – Add "… if the measured external radiation level before each shipment exceeds § 71.47(a)." (clarification)
  - (10) – Replace with "Revision 16 of this CoC and its letter amendment dated October 13, 2023, may be used until December 31, 2024. Revision 17 of this CoC may be used until May 31, 2025." (allow time for procedure updates)
- Section 5(e), Supplements – add "Safety Analysis Report for Packaging Model 9979 Type AF Shipping Package, S-SARP-G-00006, Revision 7, Supplement for Docket 23-11-9979, Rev 1 (Chapter 1) and Supplement for Docket 23-11-9979 (Chapter 5), January 10, 2024."

Conclusion

Based on the statements and representations contained in the SARP Supplement for Docket 23-11-9979 and the conditions listed above, DOE PCP staff concludes that the package design has been adequately described and evaluated and the Model 9979 continues to meet the requirements of 10 CFR Part 71.

References

[1] *Model 9979 Type AF-96 – Content Envelope Limits*, Memorandum, PAD-23-008, Budney to James Shuler, December 8, 2022.
[2] *Shielding evaluation and SARP impact for Docket 23-11-9979*, Email, with three attachments, Sobus to Shuler, February 13, 2023
[3] *Transmittal of the Shielding Evaluation for 9979 SARP Content Table 1.2*, Letter, SRNL-L2200-2023-00005, Rev. 0, Howard to Sobus, February 9th, 2023 (attachment to Ref 2).
[4] *Shielding Analysis for the 9979 Shipping Package with 15 grams of Uranium*, N-CLC-A-00108, Revision 0, February 2023 (attachment to Ref 2).
[5] *Impact Evaluation of N-CLC-A-00108 on Model 9979 SARP*, Attachment to SRNL-L2200-2023-00005, February 2023 (attachment to Ref 2).
[6] *Shielding Analysis for the 9979 Shipping Package with 15 grams of Uranium*, N-CLC-A-00108, Revision 1 draft, May 8, 2023
[7] *Docket 23-11-9979 Draft Shielding Calculation Review*, Memorandum, Shuler to Sobus, June 26, 2023.
[8] *Transmittal of 9979 SARP Rev 7 Supplement for Docket 23-11-9979*, Email, with pending attachments, Sobus to Shuler, August 4, 2023.
[9] *Transmittal of 9979 SARP Rev 7 Supplement for Docket 23-11-9979*, Letter, SRNL-L2200-2023-00013, Rev. 0, Howard to Sobus, August 4, 2023.
[10] *Safety Analysis Report for Packagings Model 9979 Type AF Shipping Package (Supplement for Docket 23-11-9979)*, S-SARP-G-00006, Revision 7, Chapters 0 and 1, August 2023 (attachments to Ref 9).
[11] *Shielding Analysis for the 9979 Shipping Package with 15 grams of Uranium*, N-CLC-A-00108, Revision 1, July 2023 (attachment to Ref 9).
[12] *Impact Evaluation of N-CLC-A-00108, Rev 1, on Model 9979 SARP*, Attachment to SRNL-L2200-2023-00005, August 2023 (attachment to Ref 9).
[13] Transmittal of 9979 SARP Rev 7 Supplement for Docket 23-11-9979 (Additional supporting documents), Email, with attachments, Eberl to Gelder, January 11, 2024.
[14] *Safety Analysis Report for Packagings Model 9979 Type AF Shipping Package (Supplement for Docket 23-11-9979)*, S-SARP-G-00006, Revision 7, Chapter 1 Rev 1 and Chapter 5, January (attachments to Ref 13).
[15] *Standard Review Plan for Transportation Packages for Spent Fuel and Radioactive Material*, Final Report, Section 5.4, NUREG-2216, August 2020
[16] Comparison for 9979 Table 1.2 masses limited by shielding (Docket 23-11-9979) (Response to ANL Question), Email, Eberl to Gelder, October 3, 2023.