

SAFETY EVALUATION REPORT
for an Addendum to Revision 14 of the Safety Analysis Report for Packaging
for the 9975 Package

Docket 03-3-9975

Chapter 1. Introduction and General Information

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 Safety Analysis Report for Packaging^[1] (SARP) and Revision 8 of the Certificate of Compliance^[2] (CoC) for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Impurity Limit Changes

For the metal contents given in Table 1.14 – *9975 Package – Plutonium and/or Uranium Metal* (pg. 1-51) of Revision 14 of the SARP, Revision 8 to the 9975 CoC limits the allowable total impurities to 200 grams or 5 weight percent of the total plutonium mass, whichever is less. The limit on impurities does not include the gallium-alloying constituent. The proposed revision to the CoC would allow an increase in the impurity contents limit to 11 weight percent of the total content mass.

Addition of Tantalum to Table 1.18

In Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP, the allowable contents includes up to 4.4 kg of beryllium and vanadium. The proposed addendum to Revision 14 of the SARP would include tantalum as contents in Table 1.18 with a maximum allowable mass of 4.4 kg.

CALEX Standards

The proposed addendum to Revision 14 of the SARP requests the inclusion of the CALEX Standards^[6] as allowable contents.

Revisions to Measured Dose Limits

Table 7.1 of Revision 14 of the SARP - *Adjusted Dose Limits for the 9975* provides maximum allowed dose rate values. If required post-loading measurements show that the combined neutron and gamma dose rates exceed the specified limits in Table 7.1, the contents cannot be shipped in the 9975 package. The proposed addendum requests that for the contents described by Tables 1.14 and 1.15 in the SARP, the requirement in Chapter 7 to meet post-loading measured combined neutron and gamma dose rate limits of Table 7.1 be nullified. The proposed addendum further requests that the only limits that should apply are those set forth in 10 CFR 71.47, and that the limits that differentiate between *Exclusive Use* and *Non Exclusive Use* be applied.

Findings

Impurity Limit Changes

Based on review of the statements and representations provided in the proposed addenda, and additional conversations with the applicant during the teleconference of February 20, 2003,^[5] the staff concludes that there are no reasons to disallow the applicant's request. (See also Section 5.0, below.)

Addition of Tantalum to Table 1.18

Based on review of the statements and representations provided in the proposed addenda, the staff concludes that there are no reasons to disallow the applicant's request.

CALEX Standards

Based on review of the statements and representations provided in the proposed addenda,^[6] the staff concludes that the CALEX Standards are already covered by the requirements specified in Table 1.15 of the SARP. Since the CALEX Standards are presently covered, the staff sees no reason to modify the CoC to allow this particular request.

Revisions to Measured Dose Limits

Based on review of the statements and representations provided in the proposed addenda, the staff concludes that there are no reasons to disallow the applicant's request. However, further limitations may be imposed by the shipping agency.

Conditions of Approval

The following changes will be implemented in the CoC:

- The limit on total impurities for Table 1.14 contents in section 5(b)(2)(x) of the CoC will be deleted; the limit on beryllium and carbon impurities in section 5(b)(2)(viii) will be expressed as a maximum weight percent of total content mass for consistency.
- Section 5(b)(2)(xxii) of the CoC will be revised to add tantalum as an allowable composite material for the Table 1.18 contents.

- Section 5(d)(6) of the CoC will be revised to remove the requirement to meet the post-loading radiation dose rate restrictions in Table 7-1 of the SARP for the Table 1.14 and 1.15 contents.

Chapter 2. Structural Evaluation

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no structural requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the package design has been adequately described and evaluated and that the package design meets the structural requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

Chapter 3. Thermal Evaluation

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no thermal requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the thermal design has been adequately described and evaluated, and that the thermal performance of the package meets the thermal requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

Chapter 4. Containment

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no containment-related requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the containment design has been adequately described and evaluated, and that the containment performance of the package meets the containment requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

Chapter 5. Shielding Evaluation

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;

- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

Impurity Limit Changes

1. The Pu-bearing materials containing Be that were calcined by Rocky Flats to the 3013 Standard should produce an oxide form where each grain of oxide is completely homogenized. All grains may not have the same amount of Be contained within them (assuming all grains have equivalent diameters) because that depends on the spatial distribution of the Be in the original Pu-bearing material before calcination. So it may be possible to stir the oxide powder (which could happen by vibration during transport) and produce a higher dose rate from that material. This situation, however, should not result in a significant increase in the measured dose rate.
2. The original SARP analysis did not use a bounding source, and the original Safety Evaluation Report (SER) was predicated on expected dose rates that were based on the possibility of the contents moving within the package during transport, potentially giving larger dose rates at the package surface. Previous SERs for other packages included this in bounding dose-rate analyses. Again, however, this should not be expected to result in a significant increase in dose rate, and should be considered to be part of the risk of transporting any powdered radioactive material that can change location within the inner containment.
3. In addition, uncertainties in the dose-measuring instrumentation were factored into the original SER to protect against the possibility of measuring a higher dose rate after transport due only to different instrumentation. This latter source of uncertainty had never been considered in any previous package SER, and may be considered as just part of the accepted risk of using different measuring devices before transport than after transport. Therefore, this too can be dismissed as being part of the routine risk for any shipment.

Considering items 1–3, above, it can be concluded that the high dose-rate cans of Pu-bearing oxide from Rocky Flats containing Be may produce a slightly higher dose rate reading after transport than before, but the risk of this does not appear to be significant. It is difficult to quantify the amount of increase, but a figure of 10% may be realistic.

Additional Findings

Based on review of the statements and representations in the SARP and the application, the staff concludes the shielding design has been adequately described and evaluated, and that the package design meets the external radiation requirements of 10 CFR Part 71.

Conditions of Approval

The following changes will be implemented in the CoC:

- The limit on total impurities for Table 1.14 contents in section 5(b)(2)(x) of the CoC will be deleted; the limit on beryllium and carbon impurities in section 5(b)(2)(viii) will be expressed as a maximum weight percent of total content mass for consistency.

Chapter 6. Criticality Evaluation

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 Safety Analysis Report for Packaging^[1] (SARP) and Revision 8 of the Certificate of Compliance^[2] (CoC) for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

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- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no criticality-related requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the criticality design has been adequately described and evaluated, and that the criticality performance of the package meets the criticality requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

Chapter 7. Operations

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 Safety Analysis Report for Packaging^[1] (SARP) and Revision 8 of the

Certificate of Compliance^[2] (CoC) for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

Table 7.1 of Revision 14 of the SARP - *Adjusted Dose Limits for the 9975* provides maximum allowed dose rate values. If required post-loading measurements show that the combined neutron and gamma dose rates exceed the specified limits in Table 7.1, the contents cannot be shipped in the 9975 package. The proposed addendum requests that for the contents described by Tables 1.14 and 1.15 in the SARP, the requirement in Chapter 7 to meet the post-loading measured combined neutron and gamma dose rate limits of Table 7.1 be nullified. The proposed addendum further requests that the only limits that should apply are those set forth in 10 CFR 71.47, and that the limits that differentiate between *Exclusive Use* and *Non Exclusive Use* be applied.

As part of the review process, the conclusions reached by the staff, with respect to shielding, were noted above in Section 5.0. As a result, the staff concludes that there are no regulatory reasons to disallow the applicant's request. Therefore, the existing requirement to adhere to the Table 7-1 post-loading dose rate limits will be rescinded.

Based on review of the statements and representations in the SARP and the application, the staff concludes the operating controls and procedures for the package meet the requirements of 10 CFR Part 71, and are adequate to assure the package will be operated in a manner consistent with its evaluation for approval.

Conditions of Approval

The following changes will be implemented in the CoC:

- Section 5(d)(6) of the CoC will be revised to remove the requirement to meet the post-loading radiation dose rate restrictions in Table 7-1 of the SARP for the Table 1.14 and 1.15 contents.

Chapter 8. Acceptance Tests and Maintenance

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no acceptance test-related or maintenance-related requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the acceptance tests and maintenance program has been adequately described and evaluated, and meets the requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

Chapter 9. Quality Assurance

The Savannah River Site submitted documentation to obtain regulatory approval for an amendment to Revision 14 of the 9975 SARP^[1] and Revision 8 of the CoC^[2] for the 9975 Package for changes in impurity content, Pu composites, allowed contents, and measured dose limits.^{[3], [4], [5]} The specific request identified:

- Impurity limit changes from the specified 5% allowed in Section 5(b)(2)(x) of Revision 8 of the CoC;
- The addition of Ta to the other elements allowed by Table 1.18 – *9975 Package – Plutonium Composites* of Revision 14 of the SARP;
- Allowance for the shipment of CALEX Standards;^[6] and
- Revisions to the Measured Dose Limits for the 9975.

Findings

There are no quality assurance-related requirements associated with the proposed addenda to Revision 14 of the 9975 SARP and/or Revision 8 of the 9975 CoC.

Based on review of the statements and representations provided in the proposed addenda, and conversations with the applicant, the staff concludes the quality assurance requirements for the package have been adequately described and evaluated, and meet the requirements of 10 CFR Part 71.

Conditions of Approval

No additional Conditions of Approval are required.

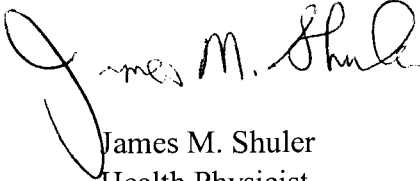
References

- [1] Transmittal letter from W. J. Johnson, Vice President and General Manager, Nuclear Materials Management Division, Westinghouse Savannah River Company, to Mr. R. K. Hall, Acting Assistant Manager, Material and Facility Stabilization, U.S. DOE Savannah River Operations Office, *TRANSMITTAL OF 9975 SAFETY ANALYSIS REPORT FOR PACKAGING (SARP) REVISION 14 CHANGED PAGES* (October 15, 2002).
- [2] Revision 8, U.S. Department of Energy Certificate of Compliance for Radioactive Materials Packages, USA/9975/B(M)F-85 (DOE), issued January 14, 2003.
- [3] E-mail message, From: Thorp, Donald; Sent: Wednesday, January 29, 2003 7:58 AM; To: Hicks, Dave; Cc: Leonard, Bob; Dart, Bob; Wilson, Larry; Geinitz, Rick; Subject: 9975 Rev 0 SARP Certification Needs (U).
- [4] E-mail message, From: Dart, Bob; Sent: Thursday, February 20, 2003 6:36 AM To: Hicks, Dave; Leonard, Bob; Thorp, Donald; Subject: Approvals Needed; Attachment: Necessary approvals for the 9975.doc.

- [5] Conference Call; Lawrence Livermore National Laboratory, DOE/EM-5, Eagle Research Group, Savannah River Site, Rocky Flats Engineering Technology Center; SUBJECT: 9975 Rev. 0 SARP Certification Needs (U); 1:00–2:30 PM PST, February 20, 2003.

- [6] Interoffice Memorandum; TO: Peter Prassinis, Lawrence Livermore National Laboratory; Steve Primeau, Eagle Research; FROM: G.A. Abramczyk, SRTC Radioactive Materials Packaging Technology; SUBJECT: Transmittal of “CalEx” Standards Information (U); SRT-RMPT-2003-00004 (February 21, 2003).

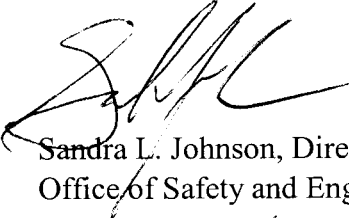
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