



U.S. DEPARTMENT *of* ENERGY

Office of Environmental Management

DOE Packaging Certification Program

SAFETY EVALUATION REPORT

Amendment of Certificate of Compliance No. 9390 for the Model OPTIMUS®-L Package

Docket No. 25-34-9390

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This Safety Evaluation Report (SER) documents the U.S. Department of Energy (DOE) Packaging Certification Program (PCP) independent review of a revision to Safety Analysis Report for Packaging (SARP) Revision 2, page-changes, prepared by NAC International (NAC) for the Sandia National Laboratory (SNL) on behalf of the Sandia Field Office (SFO) for amendment of DOE Certificate of Compliance (CoC) Number 9390, Revision 0, for the Model OPTIMUS®-L package design.

Evaluation

DOE issued a letter of authorization on August 5, 2025, based on DOE PCP staff review of SARP Rev. 1 ^[1] to authorize use of the OPTIMUS®-L package for shipment of an enriched UO₂-Gd₂O₃ mixture and other debris from SNL Degraded Core Coolability (DCC) experimental assemblies for disposal, and clarifications to the maximum activity limits for key individual gamma-emitting and neutron-emitting contents. Shortly after the issuance of that letter, NAC discovered an error in the SARP with respect to the mass loading limit for plastic (12 kg) with the authorized contents.

By letter ^[2] dated August 19, 2025, NAC submitted a request to increase the plastic limit from 12 kg to 86 kg in SARP Section 1.2.2.2, *Loading Restrictions*, and to correct a typo in SARP Note of Table 1.2.5, *UO₂-Gd₂O₃ Bounding Allowed Content Per Package*, to change the decay heat from 2.03E-3 to 2.03E-2 watts. The application in support of this request included SARP Rev 25A ^[3], which consisted of three enclosures: a SARP impact review, a list of SARP page changes, and the actual draft SARP page changes.

The applicant's impact review with SARP Rev 25A evaluated the impact of the plastic limit increase with respect to each chapter of the SARP to demonstrate the change did not affect the safety basis of previously approved DOE letter of authorization. Based on the applicant's impact review, the plastic limit mass increase is bounded by the existing SARP, except for the change to the content description for Irradiated Fuel Waste. The primary reason is that the 12 kg plastic mass limit in SARP Rev. 1, was an estimate and not an absolute limit because the applicant's flammable gas generation rate is based on the G-value (polyethylene) and content decay heat; consequently, the mass of plastic is not a factor.

DOE PCP staff concurs that the existing evaluation in SARP Rev. 1, bounds this increase in plastic mass and does not require changes to SARP Chapters 2 through 9. The staff reviewed SARP Revision 25A (page changes) and determined that the description of the change in SARP Chapter 1, *General Information*, Section 1.2.2.2, provides a sufficient basis to evaluate the package.

The staff concurs that the applicant's energy limiting approach using the G-value and decay heat makes the gas rate independent of plastic mass; however, the NTESS Burial Canisters still require 20% void space in each canister to prevent gas accumulation of more than 2.5% concentration in each layer of plastic confinement, and a maximum gross weight limit of 450 lb. (204.1 kg) per canister.

The staff confirmed by document review that the change did not affect the structural, thermal, containment, shielding, or criticality evaluations in the SARP Rev. 1 under normal and accident conditions, or the operating procedure or acceptance testing and maintenance of the package, as documented in the previous SER (Docket 24-09-9390).

The staff notes that since the applicant's shielding evaluation in SARP Chapter 6, does not credit

dunnage and other materials in the CCV for radiation protection, the increased plastic mass (neutron shielding) is not credited for packaging and transportation safety.

The staff also confirmed the increased plastic mass did not affect the assumptions used in the applicant's criticality evaluation in SARP Chapter 6, which is conservative in that it does not credit geometry control or depletion of Gd neutron absorber concentration for the optimal flooded configurations. Consequently, the maximum reactivities calculated under these conservative assumptions are expected to bound any real interaction scenarios with plastics used as contamination control around the multilayered DCC experiments, as documented in the SNL *Nuclear Criticality Safety Assessment for AHCF Campaign Plan #16 Activities*, NCS-CSA-020, Rev. 1, in Section 5, NoP Control #9.

The staff completed a review of the changes in SARP Rev 25A with SARP Rev.1, pending submittal of SARP Rev 2. By letter ^[4] dated August 25, 2025, NAC, with SFO and SNL concurrence by email, submitted SARP Rev 2.^[5] The staff confirmed the Rev 25A changes were implemented in SARP Rev. 2.

Based on the statements and representations in SARP Rev. 2, and the conditions listed in this SER, DOE PCP staff independently confirmed by document review that the package content change has been adequately described and evaluated. Therefore, the staff has reasonable assurance that the regulatory requirements of 10 CFR Part 71 have been met and recommends amendment of the CoC by the DOE Headquarters Certifying Official (HCO).

Conditions of Approval

The following conditions are required in a letter of authorization issued by the DOE HCO to authorize use of the package for limited shipments of these contents, for disposal.

DOE CoC No. 9390, Revision 0, for the Model No. OPTIMUS®-L package is amended to authorize the use of the package for limited shipments of UO₂-Gd₂O₃ subject to the conditions below:

1. The contents must not exceed the limits in Tables 1.2-4 *Criticality Limits for UO₂-Gd₂O₃ Fuel Material*, and 1.2.5 *UO₂-Gd₂O₃ Bounding Allowed Content Per Package* of the SARP, Revision 2.
2. The contents must be prepared per the Loading Restrictions in Section 1.2.2.2 *Irradiated Fuel Waste* of the SARP for UO₂-Gd₂O₃.
3. All other conditions of DOE CoC No. 9390 shall remain the same.
4. This authorization expires on July 31, 2027.

Conclusion

Based on the statements and representations contained in SARP Rev. 2, and the conditions listed above, DOE PCP staff concludes that the Model OPTIMUS-L® package design has been adequately described and evaluated and continues to meet the requirements of 10 CFR Part 71.

References

- [1] *OPTIMUS-L® (OPTImal Modular Universal Shipping Cask) SAFETY ANALYSIS REPORT for Packaging*, Revision 1, December 2024.
- [2] *Submission of a Request to Revise the NAC OPTIMUS®-L Transportation Package, DOE Certificate of Compliance 9390 Letter Authorization*, Letter from NAC, Heath Baldner to DOE (Julia Shenk), August 19, 2025.
- [3] *OPTIMUS-L® (OPTImal Modular Universal Shipping Cask) SAFETY ANALYSIS REPORT for Packaging*, Revision 25A, August 2025.
- [4] *Submission of NAC OPTIMUS®-L Transportation Package Safety Analysis Report for Packaging (SARP) Revision 2*, Letter from NAC, Heath Baldner to DOE (Julia Shenk), August 26, 2025.
- [5] *OPTIMUS-L® (OPTImal Modular Universal Shipping Cask) SAFETY ANALYSIS REPORT for Packaging*, Revision 2, August 2025.