



EM Environmental Management

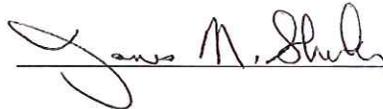
safety ❖ performance ❖ cleanup ❖ closure

DOE Packaging Certification Program

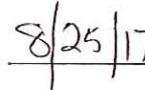
**Safety Evaluation Report for
Request to Authorize Uranium 1/3 Core with Deviations to
the Drawing for Shipment in the ES-3100 Packaging**

Docket No. 17-41-9315

Prepared by:

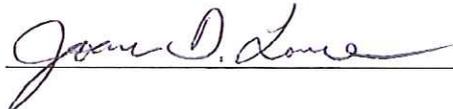


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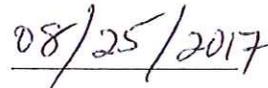


James M. Shuler
Manager, Packaging Certification Program
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Approved by:



Date:



Joanne D. Lorence
Headquarters Certifying Official
Director
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Evaluation

The Department of Energy (DOE) amended Certificate of Compliance (CoC) Revision 10 by memorandum ^[1] dated March 2, 2017 (a.k.a., letter amendment) to authorize use of the Model ES-3100 packaging for shipment of highly enriched uranium (HEU) in the form of a solid alloy part for the National Aeronautical and Space Administration (NASA). This part is defined as the "Uranium 1/3 Core" (Core) in NASA Drawing No. 130902MRA102 ^[2] and NASA specification NASA-TN24325 ^[3].

By letter ^[4] dated August 15, 2017, the National Nuclear Security Administration Office of Material Management and Minimization (NA-23) identified two, non-safety related deviations to the drawing on three Cores, and requested a revision to the March 2, 2017 letter amendment to authorize the three Cores for shipment in the ES-3100 package. Condition 1 of the letter amendment required that the Core design complies with the NASA drawing and Note 2 of the NASA drawing requires the material used to fabricate the Core meets the enrichment requirements of the NASA specification. Core part number/product numbers 3K74NVDAR2, 3K74NVD7XP, and 3K74NVDDND were out of specification with respect to the groove tolerance (+/- 0.005 inch) on Detail A of the drawing and the chemical and isotopic composition of product material exceeded the carbon limit of 400 micrograms/gram of uranium ($\mu\text{g/gU}$) and was below the minimum uranium weight percent of 92.2. These deviations were documented by the Y-12 National Security Complex (Y-12) in nonconformance report NCR-2017-0104 ^[5] and reported to NASA for disposition. NASA accepted the deviations and use-as-is-disposition on August 11, 2017 ^[6]. Y-12 closed out NCR-2017-0104 on August 15, 2017.

PCP staff reviewed the applicant's criticality analyses performed in support of the March 2, 2017 letter amendment and confirmed the deviations in dimensions of the eight axial grooves in the Core, the higher carbon content, and the slightly lower weight percent of uranium in the Core material do not effect the applicant's analyses or staff's confirmatory criticality analyses.

Staff finds that the deviations in these three products, 3K74NVDAR2, 3K74NVD7XP, and 3K74NVDDND, will not prevent the ES-3100 packaging from satisfying the requirements of 10 CFR Part 71.

Conditions of Approval

- One, Uranium 1/3 Core, Product 3K74NVDAR2 or 3K74NVD7XP or 3K74NVDDND defined in NASA Drawing No. 130902MRA102, Revision F, NASA specification TN24325, Revision 1, and with the deviations approved in NCR-2017-0104, is authorized per package.
- Uranium 1/3 Core mass shall not exceed 13 kg, maximum fissile mass shall not exceed 11,304.2 grams.
- Polyethylene, for contamination control, shall not exceed 500 grams, per containment vessel.
- Only ground transport is authorized.
- This amendment supersedes the amendment issued March 2, 2017.

- All other conditions of the certificate remain the same.

Conclusion

Based on the statements and representations in the application, PCP staff's confirmatory evaluation, and the conditions listed above, staff finds that the NA-23 request to authorize Uranium 1/3 Core, products, 3K74NVDAR2, 3K74NVD7XP, and 3K74NVDDND for shipment, in the package is acceptable, and will provide reasonable assurance that the regulatory requirements of 10 CFR Part 71 have been met.

References

- [1] *Amendment to DOE Certificate of the Compliance 9315 to Authorize Uranium 1/3 Core for shipment in the ES-3100 Package*, March 2, 2017.
- [2] *Uranium 1/3 Core*, National Aeronautics and Space Administration Drawing, No. 130902MRA102, Revision F, February 4, 2015.
- [3] *The NASA KiloPower Project Specification for the Enriched Uranium Metal Alloy Core*, NASA-TN24325, Revision 1, April 10, 2017 (approval date).
- [4] *Request for revision to letter amendment dated March 2, 2017 for an HEU Alloy Part in the ES-3100 Package, CoC USA/9315/B(U)F-96 (DOE)*, letter from William E. Kilmartin to James M. Shuler, August 14, 2017.
- [5] Y-12 National Security Complex Nonconformance Report Number NCR-2017-0104, July 26, 2017.
- [6] NASA Letter, from Donald T. Palac to Hollie Longmire (Y-12) dated August 11, 2017.