Department of Energy
Washington, DC 20585

11/25/2024

Mr. Don Shaw
Licensing Manager
TN Americas LLC
7160 Riverwood Drive
Suite 200
Columbia, MD 21046

Dear Mr. Shaw,

In response to your request dated October 29, 2024, as concurred with by Jeffrey Bentley (DOE-SR) by email on October 29, 2024, enclosed is Department of Energy (DOE) Certificate of Compliance (CoC) Number 9291, Revision 0, for the Model Liqui-Rad (LR) Transport Unit Package. DOE approval is based on endorsement of Nuclear Regulatory Commission (NRC) CoC Number 9291, Revision 12, and its Safety Analysis Report (SAR), *Liqui-Rad Transport Unit Safety Analysis Report*, Revision 10, June 2024.

The purpose of issuing this DOE CoC is to support a subsequent DOE CoC amendment request prepared by Orano TN for DOE-SR to authorize use of the package for transport of DOE uranyl nitrate (UN) enriched up to a maximum of 20% U-235 to NRC or Agreement State licensees.

This CoC is issued by DOE under the authority of 49 CFR 173.7(d) and is conditional upon fulfilling the applicable Operational and Quality requirements of 49 CFR Parts 100-199 and 10 CFR Part 71, and the conditions specified in Item 5 of the CoC.

The expiration date of Revision 0 is November 30, 2030.

If you have any questions, please contact me or the Docket Manager at (803) 645-3490 or lawrence.gelder@em.doe.gov.

Sincerely,

Julia C. Shenk

Digitally signed by Julia C. Shenk
Date: 2024.11.25 14:34:22 -05'00'

Julia C. Shenk
Headquarters Certifying Official
Director
Office of Packaging and Transportation

Enclosure

cc: Doug Yates, TN Americas
Jeffrey Bently, SR
Christopher Cable, EM-4.24
Lawrence Gelder (CONTR), EM-4.24
Docket 25-10-9291

U.S. DEPARTMENT OF ENERGY

DOE Packaging Certification Program

CERTIFICATE OF COMPLIANCE
For Radioactive Materials Package

DOE F 5822.1
(5-85 Formerly EV-618)
Rev (9-2011)

1a. Certificate Number	1b. Revision No.	1c. Package Identification No.	1d. Page No.	e. Total No. Pages
9291	0	USA/9291/B(U)F-96 (DOE)	1	3

2. PREAMBLE

2a. This certificate is issued under the authority of 49 CFR Part 173.7(d).

2b. The packaging and contents described in item 5 below meet the safety standards set forth in subpart E, "Package Approval Standards" and subpart F, "Package, Special Form, and LSA-III Tests" Title 10, Code of Federal Regulations, Part 71.

2c. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. This certificate is issued on the basis of a safety analysis report of the package design or application --

(1) Prepared by *(Name and address)*:	(2) Title and Identification of report or application:	(3) Date:
TN Americas LLC 7160 Riverwood Drive, Suite 200 Columbia, MD 21046	Liqui-Rad Transport Unit Safety Analysis Report (SAR), Revision 10.	June 2024

4. CONDITIONS

This certificate is conditional upon the fulfilling of the applicable Operational and Quality Assurance requirements of 49CFR parts 100-199 and 10CFR Part 71, and the conditions specified in item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Transport Index, Other Conditions, and References:

(a) Packaging

(1) Model: Liqui-Rad (LR) Transport Unit Package

(2) Description:

The LR Package is designed to transport Type B quantities of fissile uranyl nitrate solutions. The package uses thermal and impact limiting systems to protect the containment vessel and prevent the contents from being released. The primary structural components of the LR packaging consist of a stainless-steel containment vessel, a carbon steel outer vessel and a carbon steel framing system. The containment vessel is built in accordance with ASME Pressure Vessel Code (Section VIII, Division 1) but does not require an ASME stamp. Double O-ring seals on the containment vessel's primary and secondary lids provide a leak tight seal which is leak testable. A closed-cell phenolic foam or polyurethane foam surrounds the top and bottom head area of the containment vessel and ceramic fiber blanket and board insulation are used in the sidewalls and outer lid for thermal insulation and impact absorption. The maximum volume of the contents is limited to 230 gallons which maintains a minimum ullage of 33 gallons.

The LR is a cylindrical package set in a rectangular angle frame. The dimensions of the package are approximately 56 inches long (l) x 56 inches wide (w) x 73 inches high (h). The maximum

6a. Date of Issuance: 11/25/2024	6b. Expiration Date: November 30, 2030

FOR THE U.S. DEPARTMENT OF ENERGY

7a. Address *(of DOE Issuing Office)*	7b. Signature, Name, and Title *(of DOE Approving Official)*
U.S. Department of Energy Office of Packaging and Transportation (EM-4.24) 1000 Independence Avenue, SW Washington, DC 20585	Julia C. Shenk Digitally signed by Julia C. Shenk Date: 2024.11.25 15:47:48 -05'00' Julia C. Shenk Headquarters Certifying Official Director Office of Packaging and Transportation

(2) Description (continued)

weight of the package is 5,692 pounds. The outer vessel is constructed of 10-gauge carbon steel. The containment vessel is constructed of ¼ - inch stainless steel with ¼ - inch thick flanged and dished heads. The containment vessel is rated at 50 psig pressure. Closed-cell phenolic or polyurethane foam and ceramic fiber insulation are sandwiched between the containment vessel and the package's outer shell.

The package is designed to be leak-tight (maximum allowable leak rate of $1x10^{-7}$ref-cubic centimeters per second [cm^3/s]). The containment vessel is closed using a double O-ring and is secured by sixteen 5/8 - inch stainless steel studs. The outer lid is closed with twelve 5/8 - inch stainless steel studs and the Manual Vent Enclosure (MVE) lid is secured with four 5/8 - inch stainless steel bolts and nuts. The package is also equipped with plastic plugs to vent any gases that may be generated by the insulation during a fire event. All valves and fittings are provided within sealed enclosures to contain any leakage during valve failure.

(3) Drawings:

The packaging is constructed and assembled in accordance with Drawing No. LR-SAR, "Liqui-Rad Transport Unit" (4 sheets), Rev. 11.

(b) Contents:

(1) Type and Form of Material:

Low enriched Uranyl Nitrate solutions with the specifications shown in Table 1 below. The uranium concentration must be less than or equal to 125 grams of Uranium per liter (gU/l) with an enrichment less than or equal to 5.0 wt.% ^{235}U. Non-fissile chemical impurities maybe present up to the chemical impurity specification in Table 1. Additionally, fissile isotopes are also limited to the quantities in Table 1.

(2) Maximum Quantity of Material per Package

230 gallons of Uranyl Nitrate solution with limits as shown in Table 1.

Table 1

ITEM	SPECIFICATION
Solution Density	≤ 1.17 g/cm^3
Chemical Impurities	≤ 1,500 µg/gU
Nitric Acid Normality	0.1 - 0.7
Uranium Concentration	≤ 125 gU/L
^{232}U	≤ 2.0×10^{-3} µg/gU
^{234}U	≤ 2.0×10^{3} µg/gU
^{235}U	≤ 0.05 g/gU (12 lb. max. quantity of ^{235}U per LR)
^{236}U	≤ 2.5×10^{4} µg/gU
^{238}U	remainder of uranium
Pu/Np Alpha Activity	≤ 93 Becquerel/gU
Gamma Emitters	0.515×10^{-1} Curies

(c) Criticality Safety Index: 0.0

(d) Conditions:

(1) In addition to the requirements of Subparts G and H of 10 CFR Part 71,

a. The package must be prepared for shipment and operated in accordance with the Operating Procedures in Chapter 7 of the SAR.

b. Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the SAR.

(2) Packaging must be marked with Package Identification Number USA/9291/B(U)F-96 (DOE).

(3) Transport by air is prohibited.

(4) Only DOE elements or persons working under contract to DOE elements shall consign the package for domestic transport.

(5) Nuclear Regulatory Commission (NRC) or Agreement State licensees shall not consign a DOE certified package for domestic transport but can transfer the material on-site to DOE elements or persons working under contract to DOE elements for consignment of the package.

(6) This certificate is based on DOE endorsement of NRC CoC 9291 Rev 12 and its SAR.

(e) Supplements

None