

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1 a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGE c
9291	12	71-9291	USA/9291/B(U)F-96	1	OF 3

2. PREAMBLE

- a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."
- b. 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

- a. ISSUED TO (*Name and Address*)
TN Americas LLC
7160 Riverwood Drive, Suite 200
Columbia, MD 21046
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
TN Americas LLC, application dated June 2024

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.

(a) Packaging

- (1) Model No.: 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 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.

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGE
9291	12	71-9291	USA/9291/B(U)F-96	2 OF	3

5.(a)(2) Description (Continued)

The package is designed to be leak-tight [maximum allowable leak rate of 1×10^{-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.

5.(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 may be 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	$\leq 1.17 \text{ g/cm}^3$
Chemical Impurities	$\leq 1,500 \text{ } \mu\text{g/gU}$
Nitric Acid Normality	0.1 - 0.7
Uranium Concentration	$\leq 125 \text{ gU/l}$
^{232}U	$\leq 2.0 \times 10^{-3} \text{ } \mu\text{g/gU}$
^{234}U	$\leq 2.0 \times 10^3 \text{ } \mu\text{g/gU}$
^{235}U	$\leq 0.05 \text{ g/gU}$ (12 pounds maximum quantity of ^{235}U per LR)
^{236}U	$\leq 2.5 \times 10^4 \text{ } \mu\text{g/gU}$
^{238}U	remainder of uranium

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGE
9291	12	71-9291	USA/9291/B(U)F-96	3 OF	3

5.(b)(2) Maximum quantity of material per package (Continued)

ITEM	SPECIFICATION
Pu/Np Alpha Activity	≤ 93 Becquerel/gU
Gamma Emitters	0.515×10^{-1} Curies

(c) Criticality Safety Index 0.0

6. In addition to the requirements of Subpart G 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 application.
- (b) Each packaging must be acceptance tested and maintained in accordance with the Acceptance Tests and Maintenance Program in Chapter 8 of the application.

7. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

8. Packagings must be marked with Package Identification Number USA/9291/B(U)F-96.

9. Transport by air of fissile material is not authorized.

10. Expiration date: July 31, 2029.

REFERENCES

TN Americas, LLC, consolidated application dated June 2024.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

**YOIRA DIAZ-
SANABRIA**

Yoira Diaz-Sanabria, Chief
Storage and Transportation Licensing Branch
Division of Fuel Management
Office of Nuclear Material Safety
and Safeguards

Digitally signed by YOIRA DIAZ-
SANABRIA
Date: 2024.07.01 13:50:07 -04'00'

Date: July 1, 2024



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

**SAFETY EVALUATION REPORT
Docket No. 71-9291
Model No. LIQUI-RAD Package
Certificate of Compliance No. 9291
Revision No. 12**

SUMMARY

By letter dated March 6, 2024 (Agencywide Documents Access and Management System [ADAMS] Accession Nos. ML24066A055, and ML24066A057), TN Americas LLC (TN or the applicant) submitted an application to revise Certificate of Compliance (CoC) No. 9291 for the Model No. LIQUI-RAD (LR) packaging.

TN requested the following changes to the CoC:

Inclusion of a more detailed inspection criteria for corrosion on the exterior surface of the package to ensure that it is maintained in an unimpaired physical condition;

Incorporation of criteria established for the inspection of corrosion on the exterior of the painted carbon steel structure of the Liqui-Rad (LR) packaging in the operating and maintenance instructions of the safety analysis report (SAR);

An evaluation to establish the inspection criteria is added to the SAR structural evaluation;

Revision of Drawing LR-SAR for package approval in the SAR to be more consistent with the as-built LR packaging.

These changes resulted in revisions to Section 1 – General Information, Section 2 – Structural Evaluation, Section 7 – Operating Procedures, and Section 8 – Acceptance Tests and Maintenance Program, and Drawing Number LR-SAR.

The applicant also requested renewal of the certificate, as part of this amendment request.

The staff reviewed the changes to the operating procedures, maintenance program, and engineering drawing for package approval. TN responded to staff's RAIs (ADAMS No. ML24159A807) and submitted a consolidated application dated June 17, 2024 (ADAMS No. ML24169A170).

The staff used the guidance in NUREG-2216, "Standard Review Plan for Transportation

Packages for Spent Fuel and Radioactive Material” to perform the review of the proposed packaging changes.

Based on the statements and representations in the consolidated application dated June 17, 2024, and the conditions listed in the CoC, the U.S. Nuclear Regulatory Commission staff (the staff) concludes that the package meets the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71.

EVALUATION

Detailed Inspection Criteria for corrosion on the exterior surface of the package – Section 2 and Appendix 2.10

The staff evaluated the applicant’s addition of Appendix 2.10.10 to establish corrosion allowance limits for use in the visual inspection of external structure and shell, stating that the corrosion allowances are documented in an engineering evaluation that has been previously approved by the NRC letter authorization dated July 10, 2023 (ADAMS No. ML23184A066)

The staff reviewed the new Appendix 2.10.10 addition proposed in the next revision and verified that the allowances listed for sheet metal corrosion and structural steel corrosion are consistent with the allowances as previously approved by the July 10, 2023, letter authorization.

Operating and Maintenance Instructions Revisions and Additions – Sections 7 and 8

The staff evaluated the applicant’s revisions to Section 7 – Operating Procedures and Section 8 – Acceptance Tests and Maintenance Program.

The staff reviewed the proposed revision to Section 7, which included criteria for visual inspection prior to package use, revision of operating procedures, and addition of essential elements for package operation or remove excessive detail and specificity. The applicant stated that the guidance for visual inspection has been previously approved by the NRC letter authorization which was based on a review of inspection reports for 30 packages where the applicant stated the visual and weld acceptance criteria were satisfied. In the NRC letter authorization, the staff also determined that the visual inspection process described and the documented inspection reports for the 30 LR230 packages would continue to meet 10 CFR Part 71 requirements. The applicant stated that the proposed revision is necessary to align operation requirements with operational experience and steps needed to ensure the package performance.

The staff reviewed Section 7 which was replaced in its entirety with revised operating procedures. The staff verified that Section 7 included the appropriate additional visual inspections for corrosion, which had been previously approved, and therefore finds the proposed revision acceptable. Based on its evaluation, the staff concludes that the combination of the engineered safety features and the revised operating procedures provide adequate measures and reasonable assurance for the safe operation of the LR230 in accordance with 10 CFR 71.

The staff also reviewed the proposed updates to the Section 8 detailed inspection procedures in Section 8.2 Maintenance Programs, and the new Appendix 8.3.1 that includes six visual inspections of the structural and sheet materials and one weld inspection. The staff verified that

the proposed updates to Section 8 included the appropriate visual and weld inspection procedures as previously approved and therefore finds the proposed revision acceptable.

Drawing LR-SAR Revision – Section 1

The staff evaluated the applicant's changes to Drawing LR-SAR, which included changes to Sheet 1, Sheet 2, Sheet 3, and Sheet 4.

For Sheet 1: Added weld symbol for bottom drip pan plate to indicate an intermittent weld with an alternative allowance for the weld to be continuous.

The applicant stated that the reason for this change is that packages are fabricated with both intermittent and continuous welds, but intermittent welds can allow water to accumulate in crevices and can lead to corrosion. The staff evaluated the change to Sheet 1 and finds the change to allow continuous welds acceptable as this would decrease the possibility of corrosion in the bottom drip pan plate.

For Sheet 2:

- Outer Lid Top Views – change “shackle” to “handles” and change “tamper proof seal” to “tamper indicating device”.
- Manual Vent Enclosure (MVE)– Remove weld specification for MVE Lid Handle.

The applicant stated that the change to the Outer Lid Top Views is to be consistent with the terminology introduced in operating procedures changes in Chapter 7.

The staff reviewed the drawing and evaluated the changes to Sheet 2 and found that the outer lid top view changes are acceptable as these changes are consistent with the changes in Chapter 1, Table 2.1, Appendix B, Chapter 7, and Chapter 8. The staff finds the change to remove the weld specification acceptable as the MVE Lid Handle is not important to safety.

For Sheet 3:

- Secondary Lid – Remove Lid handle load rating and weld specification.
- Secondary Lid Test Port Options – Remove details for elbow specification.
- Change “Safety Seal Loops” to “Tamper Indicating Device Loop”. Add “Hole in Stud” as a feature for attaching tamper indicating device.

The staff evaluated the changes to Sheet 3 and found that the lid handle load rating and weld specification removal changes are acceptable as the lid handle is not important to safety. For the lid test port options, the staff reviewed the change to the elbow specifications and determined it to be acceptable as it is not important to safety. For the change from safety seal loops to tamper indicating device loop and hole in stud addition, the staff reviewed these changes and found them acceptable as they provide consistency with the changes to operating procedures in Section 7.

For Sheet 4:

- Changed detail specification to “Brass or Stainless Steel”.
- Change OUTER VESSEL, PLATE material from ASTM A1011 or A1008 to A36 CS, and add OUTER VESSEL, SHEET material as ASTM A1011 or A1008.
- Removed revision number from specifications for CERAMIC FIBER BLANKET, FOAM, and CERAMIC FIBER BOARD.
- Remove OUTER VESSEL LIFTING SHACKLES and OUTER LID, LID HANDLES.
- Replace requirement to mark and label per U.S. Department of Transportation (DOT) regulations with allowance to use materials other than A36, ASTM A1011 or A1008.
- Added welding inspection criteria for containment vessel and other structures.
- Replaced requirement for method of attaching name plate and added allowance to use package with damaged draw pipe, as draw pipe is known to crack.
- Removed specification for manufacturer nameplate.
- Removed statement about gasket installation.
- Removed Quality Assurance Program (QAP) record-keeping requirements.
- Replaced ANSI N14.5 specific edition year with allowance to use the most current version.

The staff evaluated the changes to Sheet 4 and found that the changes for the detail specification change are acceptable as the test port connections are not important to safety.

For the change to the outer vessel plate and outer vessel sheet specifications, the staff found the changes acceptable as ASTM A1011 or A1008 were incorrectly labeled as plate specifications and A36 CS was already in use for the flat bar and angle parts of the outer vessel.

For the change to remove revision number from the specifications to the ceramic fiber blanket, foam, and ceramic fiber board, the staff found the change acceptable as the approved revisions are stated in Appendices 1.3.2, 1.3.3, and 1.3.4.

For the change to remove outer vessel lifting shackles and outer lid handles, the staff found the change acceptable as the outer vessel lifting shackles and outer lid handles are not structural components of the package.

For the change to remove the requirement to mark and label per DOT regulations, the staff found this change acceptable as equivalent material properties are used and the components do not perform a safety function.

For the change to add welding inspection criteria for containment vessel and other structures, the staff found the change acceptable as the containment vessel welds will be performed per ASME Section VIII, Division 1, as stated in the SAR. For non-important to safety components, welding, and inspection in accordance with AWS D1.1 or equivalent are acceptable.

For the change to remove the requirement for method of attaching name plate with allowance to use package with damaged draw pipe, the staff found the change acceptable as the performance of the package is not affected by the method of attaching a name plate, and the draw pipe is not part of the containment boundary.

For the change to remove the specification for manufacturer nameplate, the staff found the change acceptable as the markings required by regulation are specified in Note 10 of the drawing.

For the change to remove the statement about gasket installation, the staff found the change acceptable as the requirements for maintaining and installing gaskets are discussed in SAR Sections 7.1, 8.1, and 8.2.

For the change to remove the QAP record-keeping requirements, the staff found the change acceptable as the implementation procedures of the QAP specifies the design and fabrication record requirements.

For the change to replace ANSI N14.5 specific edition year with allowance to use the most recent version, the staff found that the proposed change to allow the most recent version of ANSI N14.5 acceptable because the package will continue to meet the requirements of Part 71 for leak testing.

CONDITIONS

The following Conditions have been modified in the certificate:

Item No. 3(b) was modified to reference the June 17, 2024, consolidated application.

Condition No. 5(a)(3) was updated to include the revised licensing drawings.

Condition No. 10 was updated with the new expiration date of the certificate of July 31, 2029.

The Reference section of the certificate was updated to the June 17, 2024, Safety Analysis Report.

CONCLUSION

Based on the statements and representations contained in the application, and the conditions listed above, the staff concludes that the design has been adequately described and evaluated, and the Model No. LIQUI-RAD package meets the requirements of 10 CFR Part 71.

Issued with CoC No. 9291, Revision No. 12.