

U.S. NUCLEAR REGULATORY COMMISSION
CERTIFICATE OF COMPLIANCE
For Radioactive Materials Packages

1.(a) Certificate Number	1.(b) Revision No.	1.(c) Package Identification No.	1.(d) Pages No.	1.(e) Total No. Pages
9932	0	USA/9932/B	1	3

2. PREAMBLE

- 2.(a) This certificate is issued to satisfy Sections 173.393a, 173.394, 173.395, and 173.396 of the Department of Transportation Hazardous Materials Regulations (49 CFR 170-189 and 14 CFR 103) and Sections 146-19-10a and 146-19-100 of the Department of Transportation Dangerous Cargoes Regulations (46 CFR 146-149), as amended.
- 2.(b) The packaging and contents described in item 5 below, meets the safety standards set forth in Subpart C of Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions."
- 2.(c) 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--

3.(a) Prepared by (Name and address):	3.(b) Title and identification of report or application:
University of California Lawrence Livermore Laboratory P.O. Box 808 Livermore, CA 94550	Safety Analysis Report on Model UC-609 Shipping Package, Report No. UCRL-52424, August 1977
	3.(c) Docket No. 71-9932

4. CONDITIONS

This certificate is conditional upon the fulfilling of the requirements of Subpart D of 10 CFR 71, as applicable, and the conditions specified in item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Fissile Class, Other Conditions, and References:

(a) Packaging

- (1) Model No.: UC-609
- (2) Description

Packaging for large quantities of tritium. The containment vessel is 1/8-inch thick type-316 stainless steel, 18-inches in diameter by 44 inches long. An aluminum tube forms a 10-inch diameter by 31-inch long containment cavity. The space between the stainless steel outer shell and the aluminum tube is filled with aluminum honeycomb. Access to the containment cavity is through a 10-inch diameter opening at one end. Positive closure of the flanged stainless steel cover plate is accomplished using eight (8) 3/8-inch alloy steel bolts. The cover closure is sealed with an inner copper gasket and outer viton o-ring seal. A valved port between these gaskets is provided for leak testing. A manifold containing a valve and 200 psig pressure gage is welded to the center of the cover plate. The containment vessel is centered and supported within a 16-gage steel drum 25 inches in diameter by 54-1/2 inches high using celotex insulation. The package gross weight is 500 pounds.

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(3) Drawings

The packaging is constructed in accordance with Lawrence Livermore Laboratory Drawings Nos.: AAA76-109771-0C, AAA75-113967-0B, AAA75-113083-0A, AAA77-102165-00, AAA75-112930-0A, AAA77-104161-00, AAA77-104165-0A and AAA77-104163-0B.

(b) Contents

(1) Type and form of material

Tritium in any form held within secondary containers.

(2) Maximum quantity of material per package

Decay heat not to exceed 48 watts. Not more than 25 gm-moles (150 grams) of tritium.

6. The initial pressure within the containment vessel and secondary containers shall be such that if all gases were released from the secondary containers the maximum pressure within the containment vessel, at 20°C (68°F) would not exceed:
 - (i) 84 psig when no water is present, or
 - (ii) 45 psig when water is present.
7. The weight of the secondary containers shall not exceed a total of 120 pounds.
8. Acceptance tests and maintenance shall be in accordance with Section 8.0 of Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977.
9. Operating procedures equivalent to those specified in Section 7.0 of Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977, shall be established for use.
10. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR §71.12(b).
11. Expiration date: September 30, 1984.

REFERENCE

Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Charles E. MacDonald

Charles E. MacDonald, Chief
Transportation Certification Branch
Division of Fuel Cycle and
Material Safety

Date: SEP 13 1979

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U.S. NUCLEAR REGULATORY COMMISSION
SAFETY EVALUATION BY THE TRANSPORTATION BRANCH
OF THE MODEL NO. UC-609 PACKAGE
USA/9932/B

Encl to ltr dtd SEP 18 1979

Summary

By application dated August 25, 1978, the U.S. Department of Energy requested approval for the Model No. UC-609 packaging to be used for shipment of large quantities of tritium.

Based on the statements and representations contained in the application the staff has concluded that the Model No. UC-609 and its contents as described meet the requirements of 10 CFR Part 71.

Reference

Lawrence Livermore Laboratory Report No. UCRL-52424, August 1977.

Drawings

The packaging is constructed in accordance with Lawrence Livermore Laboratory Drawings Nos.: AAA76-109771-0C, AAA75-113967-0B, AAA75-113083-0A, AAA77-102165-00, AAA75-112930-0A, AAA77-104161-00, AAA77-104165-0A and AAA77-104163-0B.

Description

Packaging for large quantities of tritium. The containment vessel is 1/8-inch thick type-316 stainless steel, 18-inches in diameter by 44 inches long. An aluminum tube forms a 10-inch diameter by 31-inch long containment cavity. The space between the stainless steel outer shell and the aluminum tube is filled with aluminum honeycomb. Access to the containment cavity is through a 10-inch diameter opening at one end. Positive closure of the flanged stainless steel cover plate is accomplished using eight (8) 3/8-inch alloy steel bolts. The cover closure is sealed with an inner copper gasket and outer viton o-ring seal. A valved port between these gaskets is provided for leak testing. A manifold containing a valve and 200 psig pressure gage is welded to the center of the cover plate. The containment vessel is centered and supported within a 16-gage steel drum 25 inches in diameter by 54-1/2 inches high, using celotex insulation. The package gross weight is 500 pounds.

Contents

The applicant has requested approval for contents limited by 30 moles of gas held within secondary containers, with a maximum of 25 moles of tritium in any

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form within the containers. The secondary containers are to be limited by a maximum weight of 120 pounds and a solid volume not to exceed 20 liters.

The restriction of 25 moles of tritium provides a restriction on radioactivity, the other restrictions (30 moles of gas, 20 liter of displaced volume and 120 pounds for secondary containers) pertain to the structural integrity of the containment vessel. The NRC approval will, therefore, restrict the contents to tritium in any form held within secondary containers. Decay heat not to exceed 48 watts, and tritium not to exceed 25 moles (150 gms). The restrictions that pertain to structural integrity will be treated as separate conditions of approval.

Summary of Safety Evaluation

The radioactive contents is tritium which is a nonfissile, weak beta emitting gas. Tritium gives off no penetrating radiation, and there will be no significant radiation exposure from the Model No. UC-609. The only remaining safety consideration is containment of the radioactive contents under the normal and hypothetical accident test conditions of 10 CFR Part 71.

Containment

Containment is provided by the type-316 stainless steel cylinder. The vessel is a rolled and welded cylinder with formed semielliptical heads at each end. It is 18 inches in diameter, 40-inches long and has 1/8-inch thickness. Access into the vessel is through a 10-inch I.D. flange welded into the top end head. A cover assembly containing a mating flange is held in place by (8) 3/8-inch bolts. The cover is sealed by an inner copper gasket and outer viton o-ring. A valved port provides access to the space between the seals for testing. A valved manifold with a pressure gage penetrates the cover plate, and provides access for sampling, testing, etc.

There is no significant damage to the containment vessel as a result of normal and accident tests specified in 10 CFR Part 71, Appendix A and Appendix B. To ensure the containment capability of the design and as built packages, leak test requirements as recommended by Regulatory Guide 7.4 for packages before first use and periodic testing have been determined for the tritium contents.

General Standards for All Packaging

Compliance with the general standards was demonstrated by analysis.

Normal Conditions of Transport

Demonstration of the adequacy of the packaging to satisfy the requirements of 10 CFR Part 71 for normal conditions of transport was accomplished by analysis, prototype testing and comparison with similar packaging. The applicant reported

that no reduction in packaging effectiveness was observed following performance of these tests.

Hypothetical Accident Conditions

The sequential tests of 10 CFR Part 71, Appendix B, were performed on prototype packages to demonstrate the adequacy of the design to satisfy performance requirements for accident conditions. The packaging was not significantly damaged by the test sequence. Leak tests were performed to demonstrate the adequacy of the containment under accident damage conditions.

Containment Vessel Integrity

In order to maintain the containment vessel integrity for normal and accident conditions restrictions must be placed on the contents to limit the internal pressures to the design values. The design pressures for normal and accident conditions are 103 psig and 125 psig, respectively. Rather than use the restrictions proposed by the applicant (see "Contents," above) a more general restriction which addresses pressure directly is proposed by the staff. The initial fill pressures are to be limited for a 20°C (68°F) initial temperature, to satisfy the applicant's design criteria. The maximum reported temperatures [76°C (170°F) and 141°C (286°F)] for normal and accident conditions were used to establish initial fill pressures of 84 psig and 45 psig at 20°C (68°F) for dry shipments and shipments with water present. Since the contents may be pressurized into secondary containers, the condition must be stated to restrict the pressure for contents distributed in the containment vessel. Since the contents in secondary containers are held within the 10-inch diameter by 31-inch cavity, there is sufficient free space so that any possible internal pressure increase due to liquid expansion within the vessel for shipments containing water will be negligible.

Operating Procedures, Test and Maintenance

The applicant has provided a comprehensive set of procedures and testing specifications in Sections 7.0 and 8.0 of the Safety Evaluation Report (Report No. UCRL-52424). These sections should be incorporated as conditions of approval.

Conclusion

The applicant has demonstrated the adequacy of the packaging design to meet the performance requirements of 10 CFR Part 71, by analysis and testing. The staff has reviewed the applicant's safety analysis, and concludes that the requirements of 10 CFR Part 71 have been satisfied.

Charles E. MacDonal
 Charles E. MacDonal, Chief
 Transportation Certification Branch
 Division of Fuel Cycle and
 Material Safety

Date: SEP 18 1979

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