NRC FORM 618
(8-2000)
10 CFR 71

U.S. NUCLEAR REGULATORY COMMISSION

# CERTIFICATE OF COMPLIANCE
## FOR RADIOACTIVE MATERIAL PACKAGES

| 1 a. CERTIFICATE NUMBER | b. REVISION NUMBER | c. DOCKET NUMBER | d. PACKAGE IDENTIFICATION NUMBER | PAGE | | PAGES |
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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)*

Energy*Solutions*
140 Stoneridge Drive
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

Energy*Solutions* application dated December 20, 2007, as supplemented.

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.: 10-160B

(2) Description

A cylindrical carbon steel and lead shielded shipping cask, designed to transport radioactive waste material. The cask is transported in the upright position and is equipped with steel encased, rigid polyurethane foam impact limiters on the top and bottom. The package has approximate dimensions, shielding, and weight as follows:

| | |
|---|---|
| Cask height | 88 inches |
| Cask outer diameter | 78-1/2 inches |
| Cask cavity height | 77 inches |
| Cask cavity diameter | 68 inches |
| Overall package height, with impact limiters | 130 inches |
| Overall package diameter, with impact limiters | 102 inches |
| Lead shielding thickness | 1-7/8 inches |
| Gross weight (packaging and contents) | 72,000 lbs |
| Maximum total weight of contents, shoring, secondary containers, and optional shield insert | 14,500 lbs |

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

The cask body consists of a 1-1/8-inch thick carbon steel (ASME SA516 or SA537) inner shell, a 1-7/8-inch thick lead gamma shield, and a 2-inch thick carbon steel outer shell (ASME SA516). The inner and outer shells are welded to a 5-1/2-inch thick carbon steel bottom plate. The cask cavity has an optional 11-gage stainless steel liner. A 12-gage stainless steel thermal shield surrounds the cask outer shell in the region between the impact limiters. The impact limiters are secured to each other around the cask by eight ratchet binders.

The cask lid is a 5-1/2-inch thick carbon steel plate, and has a 31-inch diameter opening equipped with a secondary lid. The primary lid is sealed with a double elastomer O-ring and 24 equally spaced 1-3/4-inch diameter bolts. The secondary lid is 46 inches in diameter, is centered within the primary lid, and is sealed to the primary lid by a double elastomer O-ring and 12 equally spaced 1-3/4-inch diameter bolts. The space between the double O-ring seals is provided with a test port for leak testing the primary and secondary lid seals.

The optional cask drain and vent ports are sealed with a plug and an O-ring seal.

The package is equipped with four tie-down lugs welded to the cask outer shell. Two lifting lugs and two redundant lifting lugs are removed during transport. The lid is equipped with three lifting lugs which are covered by the top impact limiter and rain cover during transport.

An optional carbon steel shield insert may be used within the cask cavity.

(3) Drawings

The packaging is constructed and assembled in accordance with Energy*Solutions* Drawing No. C-110-D-29003-010, sheets 1 through 5, Rev. 14.

An optional shield insert is constructed in accordance with Chem-Nuclear Systems Drawing No. C-119-B-0018, Rev. 2.

5.(b) Contents

(1) Type and form of material

Explosives, corrosives, non-radioactive pyrophorics, and compressed gases are prohibited. Pyrophoric radionuclides may be present only in residual amounts less than 1 weight percent. The total amount of potentially volatile organic compounds present in the headspace of a secondary container is restricted to 500 parts per million.

(i) Byproduct, source, and special nuclear material, non-fissile or fissile-excepted, as special form, or non-special form in the form of solids, dewatered resins or process solids, or solidified waste, in secondary containers; or

(ii) Dewatered, solid or solidified transuranic-containing wastes (TRU), fissile or non-fissile or fissile-excepted, in secondary containers; or

(iii) Plutonium 239 (Pu-239) as PuBe neutron sources meeting the requirements of special form sources; or

(iv) Radioactive material in the form of activated reactor components.

(2) Maximum quantity of material per package

Type B quantity of radioactive material, not to exceed 3,000 $A_2$.

Fissile contents must be limited to the fissile gram equivalent of 325 grams of Pu-239, as determined using the conversion factors in Table 9.1.3, in Chapter 4, Appendix 4.10.2, of the application, as supplemented. TRU exceeding the fissile limits of 10 CFR 71.15 must not be machine compacted and must have no more than 1% by weight of special reflectors and no more than 25% by volume of hydrogenous material.

Plutonium content exceeding 0.74 TBq (20 Ci) must be in solid form.

Neutron sources as described in 5(b)(1)(iii) are limited to a maximum emission rate of 1.1E+8 n/sec.

Maximum decay heat not to exceed 200 watts.

Total weight of contents, shoring, secondary containers, and optional shield insert not to exceed 14,500 pounds.

5.(c) Criticality Safety Index 0.0

6. Except for close fitting contents, shoring must be placed between the secondary containers or activated components and the cask cavity to prevent movement during accident conditions of transport.

7. The cask primary lid must be secured by 24, and the secondary lid by 12, 1-3/4"-8UNC x 5-3/8" long hex cap screws with a flat washer, torqued to 300 ft-lbs ± 30 ft-lbs (lubricated). The optional drain and vent port plugs must be torqued to 20 ± 2 ft-lbs.

8. Lift lugs must be removed from the cask body prior to transport.

9. In addition to the requirements of Subpart G of 10 CFR Part 71:

   (a) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented; and

   (b) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented; and

   (c) The primary lid, secondary lid, and the optional vent and drain seals must be replaced with new seals if inspection shows any defects or every 12 months, whichever occurs first.

10. The package must be leak tested as follows:

   (a) Prior to each shipment, the package must be leak-tested in accordance with Section 8.2.2.2 of the application. For contents that meet the definition of low specific activity material or surface contaminated objects in 10 CFR 71.4, and also meet the exemption standard for low specific activity material and surface contaminated objects in 10 CFR 71.14(b)(3)(I), the pre-shipment leak-test is not required.

   (b) The packaging containment system must be leak tested in accordance with Section 8.1.3 of the application prior to first use of any packaging, and after the third use.

   (c) The packaging containment system must be leak tested in accordance with Section 8.2.2 of the application within the 12-month period prior to each use, and after seal replacement.

   (d) The helium leak test cannot be applied to elastomeric silicone rubber O-ring seals due to permeation. Elastomeric silicone rubber O-ring seals must be leak tested with an appropriate method specified in ANSI N14.5-1997, other than a helium leak test, for the leak tests identified in Sections 8.1.3 and 8.2.2 of the application.

11. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, a determination must be made by tests and measurements or by analysis of a representative package that the following criteria are met over a period of time that is twice the expected shipment time:

(1) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume (or equivalent limits for other inflammable gases) of the secondary container gas void if present at STP (i.e., no more than 0.063 g-moles/$ft^3$ at 14.7 psia and 70°F); or

(2) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen is limited to 5% by volume in those portions of the package which could have hydrogen greater than 5%.

For any package delivered to a carrier for transport, the secondary container must be prepared for shipment in the same manner in which determination for gas generation is made. Shipment period begins when the package is prepared (sealed) and must be completed within twice the expected shipment time.

(b) For any package containing materials with a radioactivity concentration not exceeding that for low specific activity material, and shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers, the determination in (a) above need not be made, and the time restriction in (a) above does not apply.

(c) For any package containing TRU the following additional conditions apply:

(1) Waste content codes and classification, physical form, chemical properties, chemical compatibility, gas distribution, and pressure buildup, container and contents configuration, isotopic characterization, fissile content, decay heat and hydrogen gas generation rate, must be determined and limited in accordance with Appendix 4.10.2 of the application;

(2) Each waste container must not exceed the decay heat limits in Section 10 of the applicable site specific appendix to Appendix 4.10.2, or must satisfy the requirements of Attachment B, “Methodology for Determination of Decay Heats and Hydrogen Gas Generation Rates for Transuranic Content Codes,” for each site specific appendix to Appendix 4.10.2 as listed below:

Appendix 4.10.2.1 Compliance Methodology for TRU Waste From Battelle Columbus Laboratories,

Appendix 4.10.2.2 Compliance Methodology for TRU Waste From Missouri University Research Reactor,

Appendix 4.10.2.3 Compliance Methodology for TRU Waste From Energy Technology Engineering Center,

11.(c) (Continued)

Appendix 4.10.2.4 Compliance Methodology for TRU Waste From Lawrence Livermore National Laboratory,

Appendix 4.10.2.5 Compliance Methodology for TRU Waste From Idaho National Engineering and Environmental Laboratory;

(3) One or more filter vents must be installed in the drum payload container. Filter vents must meet the minimum specifications in Section 8, "Payload Container and Contents Configuration" of the applicable site specific appendix to Appendix 4.10.2; and

(4) The payload containers authorized for shipment of TRU in the Model No. 10-160B are the 30-gallon and the 55-gallon drum. Up to ten payload containers of TRU waste may be packaged in the cask.

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

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

14. Packagings may be marked with Package Identification Number USA/9204/B(U)-85 until October 31, 2010, and must be marked with Package Identification Number USA/9204/B(U)F-96 after October 31, 2010. Any package transporting fissile material must be marked with Package Identification Number USA/9204/B(U)F-96.

15. Revision No. 12 of this certificate may be used until October 31, 2010.

16. Expiration date: October 31, 2010.

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REFERENCES

Energy*Solutions* application dated December 20, 2007.

Supplements dated October 3, 2008, May 1, June 11, and August 10, 2009.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

**/RA/**

Eric Benner, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: September 10, 2009.