U.S. Department
of Transportation
Pipeline and
Hazardous Materials
Safety Administration

East Building, PHH-23
1200 New Jersey Avenue Southeast
Washington, D.C. 20590

COMPETENT AUTHORITY CERTIFICATION FOR A TYPE B(U)F FISSILE RADIOACTIVE MATERIALS PACKAGE DESIGN CERTIFICATE USA/9204/B(U)F-96, REVISION 5

This certifies that the radioactive material package design described has been certified by the Competent Authority of the United States as meeting the regulatory requirements for a Type B(U)F packaging for fissile radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2].

1. Package Identification - Model 10-160B.

2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9204, Revision 22 (attached).

3. Criticality - The minimum criticality safety index is 0.0. The maximum number of packages per conveyance is determined in accordance with Table X of the IAEA regulations cited in this certificate.

4. General Conditions -

   a. Each user of this certificate must have in his possession a copy of this certificate and all documents necessary to properly prepare the package for transportation. The user shall prepare the package for shipment in accordance with the documentation and applicable regulations.

   b. Each user of this certificate, other than the original petitioner, shall register his identity in writing to the Office of Hazardous Materials Technology, (PHH-23), Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, Washington D.C. 20590-0001.

   c. This certificate does not relieve any consignor or carrier from compliance with any requirement of the Government of any country through or into which the package is to be transported.

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[1] "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency(IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

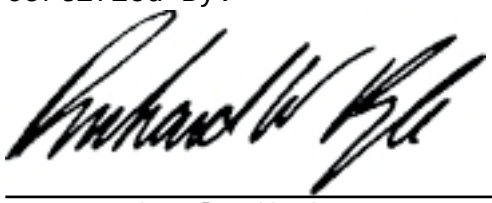
d. Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations[1] shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the applicable requirements of Subpart H of 10 CFR 71.

5. Marking and Labeling - The package shall bear the marking USA/9204/B(U)F-96 in addition to other required markings and labeling.

6. Expiration Date - This certificate expires on October 31, 2020.

This certificate is issued in accordance with paragraph 814 of the IAEA Regulations and Section 173.471 and 173.472 of Title 49 of the Code of Federal Regulations, in response to the September 08, 2015 petition by Energy Solutions, Columbia, SC, and in consideration of other information on file in this Office.

Certified By:



Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

Oct 08 2015
(DATE)

Revision 5 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9204, Revision 22.

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
9204	22	71-9204	USA/9204/B(U)F-96	1	OF	5

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)*

EnergySolutions
2105 South Bascom Ave., Suite 230
Campbell, CA 95008

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

EnergySolutions application dated January 24, 2011, 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 package, designed to transport radioactive waste material. The package 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:

Package height	88 inches
Package outer diameter	78-1/2 inches
Package cavity height	77 inches
Package 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	14,250 lbs

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

The packaging 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 packaging 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 packaging 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 secondary lid is protected by a thermal shield which consists of two polished stainless steel plates separated by a thin air gap. The thermal shield is attached to the secondary lid lifting lugs with hitch-pins. The optional 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 shield insert may be used within the cask cavity for contents as specified in Condition No. 5(b)(1)(i) through (v). For contents specified in Condition No. 5(b)(1)(vi), a shield insert shall be used. Two shield insert designs are authorized for use: Shield Insert A and Shield Insert B. The shield inserts have side walls consisting of lead with a total thickness of 6.72 inches, located between an inner 8-inch SCH 40 steel pipe and an outer 24-inch SCH 60 steel pipe. The bottom consists of 6.0 inches of lead supported by a 0.75-inch thick steel base plate. The lid includes a steel encased lead plug (nominal lead thickness 8 5/8 inches), steel bolting plate, and flat elastomeric gasket. The main difference between the two is that Shield Insert B has no drain line at the bottom as Shield Insert A does.

(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. 16.

The Secondary Lid Thermal Shield is constructed in accordance with Energy*Solutions* Drawing No. DWG-CSK-12CV01-EG-0002-01, Rev. 3.

Optional shield inserts are constructed in accordance with Drawing No. C-038-145083-004-01, Rev. 1, and C-038-145083-004-02, Rev. 1 (Shield Insert A) and Drawing No. DWG-LIN-201588-ME-0001-01, Rev. 0, and DWG-LIN-201588-ME-0001-02, Rev. 0 (Shield Insert B).

The Source Insert Steel Cribbing for shield inserts is constructed in accordance with Energy*Solutions* Drawing No. C-038-145083-005, Rev. 1.

5.(b) Contents

(1) Type and form of material

(i) Byproduct, source, and special nuclear material, non-fissile or fissile-excepted, as special form, or non-special form in the form of process solids or resins, either dewatered, solid, 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 Pu-Be neutron sources meeting the requirements of special form sources; or

(iv) Neutron activated metals or metal oxides in solid form in secondary containers; or

(v) Miscellaneous radioactive solid waste materials, including special form materials and powdered solids, in secondary containers.

(vi) Byproduct material as Co-60 loaded using a shield insert.

(2) Maximum quantity of material per package

(i) The maximum quantity of radioactive materials must be the lesser of the quantity determined by the methodology described in Attachment 1 to Chapter No. 7 of the application or 3000 A_2, except for contents specified in Condition No. 5(b)(1)(vi) for which the limit is 10,000 Ci of Co-60.

(ii) 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 No. 4, Appendix 4.10.2, of the application. Plutonium content exceeding 0.74 TBq (20 Ci) must be in solid form.

(iii) 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.

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

(v) Maximum decay heat: 200 watts.

(vi) Maximum weight of contents: 14,250 pounds including shoring, secondary containers, and either optional or mandatory shield insert. The contents of the shield insert shall have a maximum weight of 500 pounds.

(vii) Explosives, corrosives, non-radioactive pyrophorics, and compressed gases are prohibited. Pyrophoric radionuclides may be present only in residual amounts less than 1 weight percent.

(viii) The total amount of potentially volatile organic compounds present in the headspace of a secondary container is restricted to 500 parts per million.

(ix) Powdered solid radioactive materials shall not include radioactive forms of combustible metal hydrides or combustible elemental metals, i.e., magnesium, titanium, sodium, potassium, lithium, zirconium, hafnium, calcium, zinc, plutonium, uranium, and thorium, or combustible non-metals, i.e., phosphorus.

(x) Powdered solids contents with neutron emitters are not permitted.

5.(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 of Chapter No. 7 of the application. The shield inserts must be used according to Section 7.0 of Addendum A (for Shield Insert A), or Section 7.0 of Addendum B (for Shield Insert B).

(b) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter No. 8 of the application. Shield inserts must meet the Acceptance Tests and Maintenance of Section 8.0 of Addendum A (for Shield Insert A), or Section 8.0 of Addendum B (for Shield Insert B).

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

8. Flammable gas (hydrogen) concentration is limited to less than 5% in volume. For contents other than TRU waste, inerting is not allowed to limit the concentration of flammable gases. For TRU waste, compliance with the 5% hydrogen concentration limit is determined by the methods discussed in Appendix 4.10.2 of the application. For contents with a radioactivity concentration not exceeding that for Low Specific Activity material, the hydrogen concentration can be assumed to be less than 5% provided the package is shipped within 10 days of preparation, or within 10 days after venting of drums or other secondary containers.

9. Payload containers authorized for shipment of TRU waste are the 30-gallon and the 55-gallon drums. TRU waste characteristics are determined and limited in accordance with Appendix 4.10.2 of the application.

10. The non-homogeneity of the package contents may lead to elevated levels of radiation on the package surfaces. Radiation surveys must be performed to obtain measurements from all surfaces of the package, and from the outer surfaces of the vehicle enclosure, unless process knowledge or survey history indicates that elevated radiation levels are not likely to be encountered.

11. Appropriate devices or measures must secure contents in the secondary container, if necessary.

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

13. Shield Insert B shall be used only with dry-loaded contents.

14. Expiration date: October 31, 2020.

REFERENCES

EnergySolutions application dated January 24, 2011.

Supplements dated April 6, September 9, and October 28, 2011; July 20, July 26 and August 10, 2012; July 18, September 20, and November 4, 2013; and July 15, 2015.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Michele Sampson, Chief
Spent Fuel Licensing Branch
Division of Spent Fuel Management
Office of Nuclear Material Safety
and Safeguards

Date: August 19, 2015

U.S. Department
of Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

**East Building, PHH-23
1200 New Jersey Avenue SE
Washington, D.C. 20590**

CERTIFICATE NUMBER: USA/9204/B(U)F-96, Revision 5

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