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)
RADIOACTIVE MATERIALS PACKAGE DESIGN
CERTIFICATE USA/9321/B(U)-96, REVISION 0**

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) packaging for 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 3-60B.

2. Package Description and Authorized Radioactive Contents - as described in U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9321, Revision 2 (attached).

3. 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.

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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.

4. Marking and Labeling - The package shall bear the marking USA/9321/B(U)-96 in addition to other required markings and labeling.

5. Expiration Date - This certificate expires on September 30, 2020.

This certificate is issued in accordance with paragraph 808 of the IAEA Regulations and Section 173.471 of Title 49 of the Code of Federal Regulations, in response to the October 12, 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 29 2015
(DATE)

Revision 0 - Issued to endorse U.S. Nuclear Regulatory Commission Certificate of Compliance No. 9321, Revision 2.

CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9321	2	71-9321	USA/9321/B(U)-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
Suite 100, Center Point II
100 Center Point Circle
Columbia, SC 29210

b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

EnergySolutions application, Revision No. 3, dated July 27, 2010.

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.: 3-60B

(2) Description

A cylindrical austenitic stainless steel and lead shielded packaging for shipment of Type B quantities of radioactive waste materials. The packaging is transported in the horizontal position in a shipping cradle where it is supported and tied down by its four trunnions. Trunnions are structural parts of the packaging.

Approximate dimensions and weights are as follows:

Packaging Height	125-5/8 inches
Packaging Outer Diameter	51-1/2 inches
Packaging Cavity Height / Diameter	109-3/8 inches / 35 inches
Overall Package Height, with impact limiters	165 inches
Overall Package Diameter, with impact limiters	82 inches
Package Total Gross Weight	80,000 lbs
Maximum Total Weight of Contents, Secondary Containers and Cavity Spacers	9,500 lbs

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

The packaging has two configurations: Configuration A and Configuration B. For both configurations, the packaging body consists of a 1 ¼-inch thick external stainless steel shell (ASTM A-240, Type 304L) and a ¾-inch thick internal stainless steel shell. The annular space between the inner and outer shells is filled with a 6-inch thick layer of lead (ASTM B-29 chemical copper). A 12-gauge stainless steel (Type 304 L) thermal shield is welded to the exterior of the external shell to provide protection during hypothetical accident fire condition events.

The lid is constructed of several circular stainless steel plates welded together for a total thickness of 10 ½ inches. Lid Configuration A is sealed by a pair of elastomer O-rings within a seal ring fabricated from austenitic stainless steel. The seal ring is partially recessed within a machined groove on the inside surface of the outer lid and welded in place. Lid Configuration B is sealed using three elastomer O-rings which are placed into grooves machined directly into the outer lid's inner surface. The middle O-ring serves as the containment boundary and the inner and outer O-rings serve as O-ring seal test boundaries. In both Configuration A and Configuration B, a bolting ring provides sealing and bolting surfaces for the lid at the top end of the packaging. Sixteen equally spaced 1 ½-inch diameter bolts are used to secure both lid configurations.

Both lid configurations have test ports for performing periodic and pre-shipment leak testing. Periodic and pre-shipment leak-testing is accomplished in the Configuration A lid by two diametrically opposed test ports which penetrate the seal ring plate between the O-rings. Periodic and pre-shipment leak-testing is accomplished in the Configuration B lid by four test ports. Two diametrically opposed test ports are located between the inner test O-ring and the middle containment O-ring, and two diametrically opposed test ports are located between the outer test O-ring and the middle containment O-ring.

In addition, both lid configurations have a vent port plug assembly to assist in draining water from the cask cavity. There are two vent port plug assembly configurations: Configuration A and Configuration B. Both configurations utilize a cover plate, a steel rod and two O-rings. For the Configuration A vent port plug assembly, grooves are machined into a seal ring to hold the two O-rings. The seal ring is fabricated as a separate piece and welded to the cover plate. In addition, the steel rod penetrates the Configuration A vent port cover plate. For the Configuration B vent port plug assembly, the O-rings are held in place by grooves machined directly into the cover plate, and the steel rod does not penetrate the cover plate. Six ½-inch diameter hex head bolts are used to secure both vent port plug assembly configurations to the lid.

The bottom end of the packaging consists of an external circular 3-inch thick stainless steel plate, a 5-inch thick lead shield, and a ¾-inch inner containment baseplate. In Configuration A, a bottom corner forging is welded both to the 1 ¼-inch external shell plate and to the 3-inch plate. In Configuration B, the 3-inch plate is welded directly to the 1 ¼-inch external shell plate. Both Configuration A and Configuration B of the packaging employ a drain port

which is fabricated from either a single piece of austenitic stainless steel or two pieces of austenitic stainless steel joined by a full penetration weld. There are two drain port configurations which are identical except that the Configuration B drain port includes a threaded hole on the cavity side of the drain port. A set screw protects the Configuration B drain port threads and provides contamination control. The containment boundary is defined as the inner shell of the packaging body, the inner baseplate, the lid, the primary lid bolts, either the Configuration A inner O-ring or the Configuration B middle O-ring, and the vent and drain port plugs.

Cylindrical impact limiters extend approximately 15 inches beyond the outside wall of the packaging, and are constructed of fully welded stainless steel shells filled with a crushable foamed-in-place closed-cell rigid polyurethane foam with specifications described in the application.

(3) Drawings

The packaging is constructed and assembled in accordance with Energy*Solutions* Drawing No. C-002-165024-001, sheets 1-10, Rev. 5.

5.(b) Contents

(1) Type and form of material

(a) Byproduct, source, and special nuclear material in the form of inorganic solids, inorganic solidified material, and inorganic resins.

(b) Radioactive material in the form of activated and/or contaminated non-fuel bearing reactor or accelerator components or segments of components.

(2) Maximum quantity of material per package

(a) 1110 TBq (30,000 Ci) of Co-60 or equivalent. Equivalency to other radionuclides is determined by the total energy and its spectrum.

(b) Decay heat of contents must not exceed 500 watts. For contents with residual water, the total decay heat must not exceed 4.46 times the volume fraction divided by the mass fraction of water in the contents.

(c) Contents may include fissile material in compliance with the mass limits of 10 CFR 71.15. Any contents that contain more than 0.74 TBq (20 Ci) of plutonium must be in solid form.

(d) The specific activity of radioactive powdered or dispersible solids shall not exceed 330 Ci/gram of Co-60 or equivalent.

(e) Materials that auto-ignite or change phase below 350°F, not including water, shall not be included into the contents.

(f) Total weight of contents, including shoring and secondary containers, must not exceed 9,500 pounds.

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

   (a) The package shall be prepared for shipment and operated in accordance with Chapter 7 of the application.

   (b) The package shall meet the acceptance tests and be maintained in accordance with Chapter 8 of the application.

7. Contents shall be packaged in secondary containers.

8. Contents shall be placed such that the center of gravity of the package is at approximately the same location as the geometric center of the package – "approximately the same location" being defined as having a ±10% difference in distance of the cavity inside dimensions from the geometric center of the package in any direction.

9. Shoring must be placed between the secondary container and the packaging cavity to prevent movement during accident conditions of transport.

10. Flammable gas (hydrogen) concentration is limited to less than 5 % in volume. Inerting is not allowed to limit the concentration of flammable gases.

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

12. Expiration date: September 30, 2020.

REFERENCES

Energy*Solutions* application "Safety Analysis Report for the Model No. 3-60B Type B Shipping Cask," Revision No. 3, dated July 27, 2010.

Supplements dated: January 31, April 4, July 31, and November 24, 2014, and January 19 and July 15, 2015.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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

Date: September 30, 2015.

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ORIGINAL REGISTRANT(S):

Steven E. Sisley
Licensing, Reguatory Compliance Manager
Energy Solutions
2105 South Bascom Ave.
Suite 160
Campbell, CA 95008

Brandon Thomas
Licensing and Regulatory Compliance
Energy Solutions
2105 South Bascom Ave.
Suite 160
Campbell, CA 95008

Mr. Patrick Walsh
Project Manager
Energy Solutions
1009 Commerce Park Dr.
Suite 100
Oak Ridge, TN 37830

Mr. Mark Whittaker
Engineering and Licensing
Energy Solutions
140 Stoneridge Drive
Columbia, SC 29210

Mr. Patrick Paquin
GM - Engineering and Licensing
Energy Solutions
140 Stoneridge Drive
Columbia, SC 29210

Mirza I. Baig
Manager, Technical Services
Energy Solutions
Suite 100, Center Point II
100 Center Point Circle
Columbia, SC 29210