

**CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES**

1.	a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
	9216	10	71-9216	USA/9216/B()F	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
140 Stoneridge Drive
Columbia, SC 29210
- b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION
Chem-Nuclear Systems, Inc. application dated
November 24, 1987, 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.: CNS 1-13G

(2) Description

Steel encased lead shielded shipping cask. A double-walled steel cylinder protective jacket encloses the cask during transport. It is bolted to a steel pallet. The cask is closed by a lead-filled flanged plug fitted with a silicone rubber gasket and bolted closure. The cavity is equipped with a drain line and the physical description is as follows:

Cask height, in	67.19
Cask diameter, in	38.5
Cavity height, in	54.0
Cavity diameter, in	26.5
Lead shielding, in	5.0
Protective jacket height, in	81.8
Protective jacket width, in	68.0
Packaging weight, lb	25,500

(3) Drawings

The packaging is constructed in accordance with Chem-Nuclear Systems, Inc. Drawing Nos.: C-110-B-06402-001, Rev. A; C-110-B-06402-002, Rev. 2; C-110-B-06402-003, Rev. 4; and C-110-B-06402-004, Rev. A.

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	9216	10	71-9216	USA/9216/B()F	2	OF 5

5. (b) Contents

(1) Type, form and maximum quantity of material per package

Plutonium in excess of 20 curies per package must be in the form of metal, metal alloy or reactor fuel elements; and

- (i) Byproduct material and special nuclear material as solid metal or oxides. Decay heat not to exceed 600 watts. The radioactive material shall be in the form of fuel rods, or plates, fuel assemblies, or meeting the requirements of special form radioactive material.

500 gm U-235 equivalent mass; or
- (ii) Neutron sources meeting the requirements of special form radioactive material.

500 gm U-235 equivalent mass. Decay heat not to exceed 50 watts; or
- (iii) Irradiated PuO₂ and UO₂ fuel rods clad in Zircalloy or stainless steel. Decay heat not to exceed 600 watts. All fuel rods shall be contained within a closed 5-inch Schedule 40 pipe with a maximum useable length of 39-5/8 inches.

1,200 gm fissile material with no more than 300 gm fissile material per 5-inch Schedule 40 pipe.
- (iv) Process solids, either dewatered, solid, or solidified, in a secondary sealed container, meeting the requirements for low specific activity radioactive material. Fissile materials must meet the exemption standards in 10 CFR 71.53 until October 1, 2004, and 10 CFR 71.15, thereafter.
- (v) Solid nonfissile irradiated metal hardware, reactor control rods (blades), reactor start-up sources, and segmented boron carbide tubes (tube contents not to exceed a Type A quantity).
- (vi) Radioactive (Hot Cell) waste materials immobilized with cement grout and contained in a 55-gallon (or extended 55-gallon drum) DOT Specification 17H or 17C steel drum, lid and closure. The waste material must be packaged in accordance with the Procedural Outline of the Immobilization of Cell Waste Using Cement Grout, Attachment D of the application. The cement grout must be at least 50 volume percent (estimated) of the drum contents and relatively uniformly distributed throughout the drum. At least 3/4" thick layer of grout must cover all radioactive waste contents. Decay heat not to exceed 100 watts, and fissile material not to exceed 500 grams U-235 equivalent mass.

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	9216	10	71-9216	USA/9216/B()F	3 OF	5

5. (c) Criticality Safety Index

(Minimum transport index to be shown on label for nuclear criticality control)

For contents described and limited in 5(b)(1)(i), 5(b)(1)(ii), 5(b)(1)(iii), and 5(b)(1)(vi):

62.5

6. The U-235 equivalent mass is determined by U-235 mass plus 1.66 times U-233 mass plus 1.66 times Pu mass.
7. (a) For any package containing water and/or organic substances which could radiolytically generate combustible gases, determination must be made by tests and measurements or by analysis of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:
- (i) 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/ft³ at 14.7 psia and 70°F); or
 - (ii) The secondary container and cask cavity must be inerted with a diluent to assure that oxygen must be 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 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.
8. For packaging of neutron sources, the cavity drain line must be closed with a plug with a melting temperature of 200°F and the cask cavity must be dry before delivery of the package to a carrier.
9. For packaging of other than neutron sources, the cask must be delivered to a carrier dry and the cavity drain line must be closed with a plug which will maintain its seal at temperatures up to at least 620°F.
10. For the shipment of irradiated metal hardware, the use of the auxiliary shielded inner container and shoring plug shown in Chem-Nuclear Systems, Inc. Drawing Nos. 8651-E-02, Rev. A and 8651-C-01, Rev. B is authorized. The inner container must be provided with vent and drain lines.

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	9216	10	71-9216	USA/9216/B()F	4 OF	5

11. Shoring must be provided to minimize movement of contents during accident conditions of transport.
12. 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 Chem-Nuclear Systems, Inc. Operating Procedures, Section 7.0.
 - (b) Prior to each shipment the silicone rubber lid gasket(s) must be inspected. This gasket(s) must be replaced if inspection shows any defects or every twelve (12) months, whichever occurs first. Cavity drain line must be sealed with appropriate sealant applied to threads of pipe plug.
 - (c) Prior to each shipment the baseplate to cask shell weld must be visually inspected in accordance with Chem-Nuclear Systems, Inc. Operating Procedures, Section 7.0.
 - (d) The packaging must meet Chem-Nuclear Systems, Inc. Acceptance Tests and Maintenance Program, Section 8.0.
13. For packaging of neutron sources, 50 times measured neutron dose rate at one meter from the surface of a cask must be less than 1,000 mrem/hr.
14. The contents described in 5(b)(1)(iv) must be transported on a motor vehicle, railroad car, aircraft, inland water crafts, or hold or deck of a seagoing vessel assigned for sole use of the licensee.
15. The package authorized by this certificate is hereby approved for use under the general license provision of 10 CFR 71.17.
16. Transport by air of fissile material is not authorized.
17. Revision No. 9 of this certificate may be used until October 1, 2008.
18. Expiration date: October 1, 2008. This certificate is not renewable.

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	9216	10	71-9216	USA/9216/B()F	5	OF 5

REFERENCES

Chem-Nuclear Systems, Inc. application dated November 24, 1987.

Supplements dated: November 24, 1992; October 31, 1997; March 31, 1999; April 23, 2001;
December 17, 2002; and May 15, 2007.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Nelson, Chief
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety
and Safeguards

Date: August 16, 2007

