

**CERTIFICATE OF COMPLIANCE  
FOR RADIOACTIVE MATERIAL PACKAGES**

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE	PAGES
9320	3	71-9320	USA/9320/B(U)-96	1	OF 3

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

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| a. ISSUED TO ( <i>Name and Address</i> )<br><b>EnergySolutions</b><br>2105 South Bascom Ave., Suite 230<br>Campbell, CA 95008 | b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION<br><b>EnergySolutions</b> application dated October 20, 2016. |
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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.: MIDUS

(2) Description

A depleted-uranium shielded package for the transport of medical isotopes. The package has two primary components: (1) an inner cask assembly that provides containment of the radioactive material and radiation shielding, and (2) an overpack that provides impact and thermal protection.

The cask assembly consists of the cask body, closure lid, shield plug, and shield lid. The cask body is a monolithic, machined 2.5-millimeter (mm) thick stainless steel containment vessel, surrounded by approximately 62 mm of depleted uranium gamma shielding, and a 4-mm thick stainless steel outer shell. The containment system closure lid is a 19-mm thick stainless steel plate which is attached to the cask body by 8, M10 × 1.5 × 30 socket head cap screws. The containment system is sealed by two concentric ethylene propylene O-rings, and the lid is equipped with a leak test port. A stainless steel clad depleted uranium shield plug in the cask cavity and a shield lid that is installed over the closure lid provide shielding at the top end of the package. The overpack base and lid are constructed of thin stainless steel shells filled with rigid polyurethane foam. The overpack lid is attached to the base by eight recessed alloy steel bolts. The overpack lid is equipped with four stainless steel lugs for lifting and tie-down, and the overpack base has a bottom flange with four lugs that may also be used for tie-down.

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

The approximate dimensions and weight of the package are:

Overall package outer diameter	520 mm
Overall package height	551 mm
Cask assembly diameter	225 mm
Cask assembly height	347 mm
Cask cavity inner diameter	85 mm
Cask cavity inner height	134 mm
Maximum package weight	330 kg

(3) Drawings

The packaging is constructed and assembled in accordance with EnergySolutions Drawing Nos.:

TYC01-1601, Sheets 1 and 2, Rev. 2	"General Arrangement of Packaging and Contents"
TYC01-1602, Sheets 1 through 4, Rev. 2	"General Arrangement of Cask Assembly"
TYC01-1603, Sheets 1 through 3, Rev. 1	"General Arrangement of Overpack Assembly"
TYC01-1604, Sheets 1 through 3, Rev. 3	"Containment System"
TYC01-1605, Sheets 1 and 2, Rev. 1	"Closure Devices"
TYC01-1606, Sheets 1 through 3, Rev. 1	"Gamma Shielding"
TYC01-1607, Sheets 1 and 2, Rev. 0	"Heat Transfer Features"
TYC01-1608, Sheet 1, Rev. 0	"Energy Absorbing Features"
TYC01-1609, Sheets 1 and 2, Rev. 0	"Lifting and Tie-Down Devices"

(b) Contents

(1) Type and form of material

- (i) Molybdenum-99 (<sup>99</sup>Mo) with its daughter products as sodium molybdate (NaNO<sub>3</sub> 1M / NaOH 0.2M) in liquid form.

The liquid may be contained within product bottles, consisting of stainless steel flasks with stainless steel caps, with or without elastomeric seals. Various stainless steel components may be used as dunnage. The total volume of the payload hardware may not exceed 125 ml (as indicated by a maximum mass of 1.0 kg).

- (ii) Molybdenum-99 with its daughter products as solid, metallic molybdenum.

The metal will be contained within a sealed aluminum target can and placed in an aluminum carrier. The total mass of the payload shall not exceed 1.0 kg, including the target cans and carrier.

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5.(b) (2) Maximum quantity of material per package

Maximum activity	4,400 Ci <sup>99</sup> Mo
Maximum specific activity	60 Ci/ml <sup>99</sup> Mo
Liquid product volume	0 to 150 ml
Maximum mass of material	1.0 kg

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 the Package Operations in Section 7.0 of the application. Optional polymeric dunnage may be placed in the space between the cask assembly and the overpack.
- (b) The package must meet the Acceptance Tests and Maintenance Program in Section 8.0 of the application.

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

8. Expiration date: November 30, 2021.

REFERENCES

EnergySolutions application for the Model No. MIDUS transportation package dated October 20, 2016.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

/RA/

John McKirgan, Chief  
Spent Fuel Licensing Branch  
Division of Spent Fuel Management  
Office of Nuclear Material Safety  
and Safeguards

Date: 11/14/16