



Department of Energy
Washington, DC 20585

July 13, 2022

Mr. Alex Gelfond
Director of Engineering/Licensing
EnergySolutions
740 Osborn Road
Barnwell, SC 29812

Dear Alex Gelfond:

In response to your request to Dr. James Shuler dated June 9, 2022, enclosed is Department of Energy (DOE) Certificate of Compliance (CoC) Number 9168, Revision 4, for the Model 8-120B, Serial Number - S/N 8-120B-1 (24504-1) and its DOE Safety Evaluation Report (SER). The CoC is renewed for five years (from the expiration of Revision 3 on August 31, 2022).

This CoC is issued by DOE under the authority of 49 CFR Part 173.7(d) and is conditional upon the user fulfilling the applicable Operational and Quality requirements of 49 CFR parts 100-199 and 10 CFR Part 71, and the conditions specified in Item 5 of the CoC.

The expiration date of Revision 4 is August 31, 2027.

If you have any questions, please contact me or Dr. Shuler at (301) 903-5513.

Sincerely,

Julia C. Shenk

Digitally signed by Julia C.
Shenk
Date: 2022.07.13 13:13:53
-04'00'

Julia C. Shenk
Headquarters Certifying Official
Director
Office of Packaging and Transportation

Enclosures

cc: James Shuler, EM-4.24
Docket 22-40-9168



U.S. DEPARTMENT OF
ENERGY

DOE Packaging Certification Program

**CERTIFICATE OF COMPLIANCE
For Radioactive Materials Package**

DOE F 5822.1
(5-85 Formerly EV-618)
Rev (9-2011)

1a. Certificate Number	1b. Revision No.	1c. Package Identification No.	1d. Page No.	1e. Total No. Pages
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2. PREAMBLE

- 2a. This certificate is issued under the authority of 49 CFR Part 173.7(d).
- 2b. The packaging and contents described in Item 5 below meet the safety standards set forth in subpart E, "Package Approval Standards" and subpart F, "Package, Special Form and LSA-III Tests" Title 10, Code of Federal Regulations, Part 71.
- 2c. 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 —

(1) Prepared by (*Name and Address*):

EnergySolutions
740 Osborn Road
Barnwell, SC 29812

(2) Title and identification of report or application:

Safety Analysis Report for
Model 8-120B Shipping Package, Consolidated
Revision 11, dated May 2016, as
supplemented [see 5(e.)]

(3) Date:

May 2016

4. CONDITIONS

This certificate is conditional upon fulfilling of the applicable Operational and Quality Assurance requirements of 49CFR parts 100 – 199 and 10CFR Part 71, and the conditions specified in Item 5 below.

5. Description of Packaging and Authorized Contents, Model Number, Transport Index, other Conditions, and References:

(a) Packaging

- (1) Model Number: 8-120B, Serial Number - S/N 8-120B-1 (24504-1)
- (2) Description:

A cylindrical carbon steel, lead shielded, packaging designed to transport radioactive waste material. The packaging has four tie down and two or four removable lifting devices and is transported in the upright position with cylindrical foam-filled impact limiters, 102 inches outside diameter (OD), installed at each end of the packaging. The overall height of the package with the impact limiters attached is 132¼ inches. The maximum gross weight of the package is approximately 74,000 pounds (lb.), as follows:

Packaging Body	42,200 lb.
Lid	7,080 lb.
Payload	14,150 lb.
Impact Limiters	4,860 lb.
Miscellaneous	830 lb.
Package	74,000 lb.

6a. Date of Issuance: July 13, 2022

6b. Expiration Date: August 31, 2027

FOR THE U.S. DEPARTMENT OF ENERGY

7a. Address (of DOE Issuing Office)

U.S. Department of Energy
Office of Packaging and Transportation (EM-4.24)
1000 Independence Avenue, SW
Washington, DC 20585

7b. Signature, Name, and Title (of DOE Approving Official)

Julia C. Shenk
Digitally signed by Julia C. Shenk
Date: 2022.07.13 14:46:25 -04'00'
Julia C. Shenk
Headquarters Certifying Official
Director
Office of Packaging and Transportation

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The cavity of the packaging is a right circular cylinder with an internal diameter of 61 13/16 inches and a height of 74 7/8 inches. The package body consists of two shells, both fabricated of ASTM A516, Grade 70 steel. The annular space between the 1½ inch thick external shell and the ¾ inch thick internal shell is filled with 3.35 inch thick lead. The primary lid is attached to the packaging body with twenty equally spaced 2-inch diameter bolts. A supplemental 14 gauge stainless steel sheet is welded to the inside surface of the primary lid.

The centered secondary lid is attached to the primary lid with twelve equally spaced 2-inch diameter bolts. A thermal shield, consisting of two polished stainless steel plates separated by a thin air gap is attached to the secondary lid lifting lugs with hitch-pins. A 12 gauge stainless steel liner is welded to the cavity of the package and the lid surface to protect all accessible areas from contamination.

The containment boundary consists of the inner shell, the upper baseplate, the bolting ring, the inner O-rings of the lids, and the lids. Test ports for leak testing of the package are located between the twin O-ring seals for both the primary and secondary lids.

There are three configurations of the packaging: Configuration 1 includes a drain port, sealed with a rod inserted and welded in the drain port; Configuration 2 does not have a drain port; and Configuration 3 does not have a drain port and the packaging's base plate is fabricated differently than for Configuration 1 and 2. Fabrication of Configurations 1 and 2 is not authorized.

Idaho Cleanup Project (ICP) Payload Types 1 through 6 may be shipped within the cask cavity with contents specified in 5(b)(1)(iii) through (vii).

Payload Type 1 consists of up to eight (8) 55-gallon drums, containing one or more of 2R Configurations #1, #2, or #3. 2R Configuration #1 is 5 inch diameter Schedule 40 pipe approximately 25 ¾ inches in overall length, and features a 1.5 inch thick lead cylinder and 0.8 inch thick lead disk inside the 2R, and a 0.5 inch thick lead cylinder outside the 2R. 2R Configuration #2 is a 5 inch diameter Schedule 40 pipe approximately 25 ¾ inches in overall length, and features a 1.25 inch lead cylinder outside the 2R, and two 0.5 inch thick lead disks one placed on bottom and one placed on top, inside the 2R. 2R Configuration #3 is a 5 inch diameter Schedule 40 pipe approximately 25 ¾ inches in overall length and features a 1.0 inch thick lead cylinder and two 0.5 inch lead disks on placed on top and one placed on bottom, inside the 2R. All 2R configurations are surrounded by fiberboard dunnage and a plywood disk placed on the drum bottom and a second plywood disk placed prior to lid placement on a 55-gallon drum. Lids are secured by a bolted drum ring. Shoring drums must contain fiberboard dunnage.

Payload Type 2 consists of up to four (4) 110-gallon drums, containing 2R Configuration #4. 2R Configuration #4 is a 4 inch diameter Schedule 40 pipe approximately 48 inches cavity, and features a 0.75 inch thick lead cylinder and two 0.5 inch thick lead disks one placed on top and one on the bottom, inside the 2R. 2R Configuration #4 is surrounded by fiberboard dunnage and a plywood disk placed on the drum bottom and a second plywood disk placed prior to lid placement on the 110-gallon drum. Lids are secured by a bolted drum ring. Shoring drums must contain fiberboard dunnage.

Payload Type 3 consists of up to eight (8) 55-gallon 17C drums with no 2R insert, no Celotex fiberboard, and no lead shielding. Lids are secured by a bolted drum ring.

Payload Type 4 consists of up to seven (7) drums. Three (3) are 55-gallon drums contained in MACRO bags, which are overpacked into 85-gallon drum bodies (with no lid, acting as dunnage) and placed directly on cask bottom. Top layer consists of four (4) 55-gallon dunnage drums. Lids are secured by a bolted drum ring.

Payload Type 5 consists of up to eight (8) 55-gallon drums. Each 55-gallon drum is an overpack for a 30-gallon drum containing a 3 inch thick lead shield insert (providing a 3 inch inner cavity diameter, 21 inch cavity height) which is itself nested in fiberboard dunnage. Wood spacer is

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placed between lid of 30-gallon drum and lid of 55-gallon drum. Overpack lids are secured by a bolted drum ring.

Payload Type 6 consists of up to three (3) 55-gallon 17C drums (Payload Type 3 or equivalent) overpacked within 83/85-gallon drums, with up to four (4) 55-gallon drums (as either dunnage or waste drums) for balance of payload. All lids are secured by a bolted drum ring.

(3) Drawings:

The packaging is constructed and assembled in accordance with EnergySolutions Drawing No. C-110-E-0007, 8-120B Shipping Cask, sheets 1 through 6, Rev. 22.

The secondary lid thermal shield is constructed in accordance with EnergySolutions Drawing No. DWG-CSK-12CV01-EG-0001-01, 8-120B Cask Secondary Lid Thermal shield Details, Rev. 3.

Containers for Payload Types 1 and 2 are constructed in accordance with Drawing No. 784499, INTEC Assembly Arrangement for Lead Shielding of 2R Container – Configuration #1-#4, sheets 1-4, May 2014.

Container for Payload Type 5 is constructed in accordance with Drawing No. 799075, 7A Type A Configuration for 3" Lead Shielded 30 Gallon Containers, May 2016.

Drum separator for Payload Types 1, 3, and 6 (upper layer only) is constructed in accordance with Drawing ATKINS-NS-DWG-FIL-ME-0301, Payload Separator, sheets 1 through 4, Revision 2.

Cask Spacer required for Payload Type 5 and optional for Payload Types 1 and 3 is constructed in accordance with Drawing Number ATKINS-NS-DWG-FIL-ME-0302, Cask Top Spacer, sheets 1 through 3, Rev. 2.

Drum separator for Payload Type 5 is constructed in accordance with Drawing No. ATKINS-NS-DWG-FIL-ME-0303, 55/30 Gal Drum Assy Separator, sheets 1 through 3, Rev. 2.

Drum separator for Payload Type 2 is constructed in accordance with Drawing ATKINS-NS-DWG-FIL-ME-0502, Payload Separator, Pallet Spacer (For 110 Gal Drums), sheets 1 through 3, Revision 2

Cask Spacer for Payload Type 2 is constructed in accordance with Drawing ATKINS-NS-DWG-FIL-ME-0503, 110 Gal Drum Assy Spacer, sheets 1 through 3, Revision 2

(b) Contents

(1) Type and form of material

- (i) Byproduct, source, and special nuclear material, in the form of dewatered or grossly dewatered resins, solids, including powdered or dispersible solids, or solidified material, contained within secondary containers; or
- (ii) Radioactive material in the form of activated metal, or metal oxides in solid form, contained in secondary containers.
- (iii) Payload Types 1 and 2 in the form of unirradiated Light Water Breeder Reactor (LWBR) or equivalent U-233 fuel rods, pellets, and powder, grinding sludge, metallography mounts and miscellaneous debris contaminated with pellet powder, consisting of a mixture of unirradiated uranium dioxide, thorium dioxide and zirconium dioxide as ceramic materials.
- (iv) Payload Type 3 in the form of metallurgical mounts of LWBR or equivalent wastes, or various inner waste containers contaminated with LWBR fines, pellets, tools, rags, gloves, nuts, solidified solutions.

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- (v) Payload Type 4 in the form of LWBR or equivalent wastes as solidified grinding sludge and contaminated debris within MACRO bags,
- (vi) Payload Type 5 in the form of Co-60 contaminated/irradiated equipment items and debris.
- (vii) Payload Type 6 in the form of Payload Type 3 contents or equivalent, overpacked into 83 or 85-gallon drums.

(2) Maximum quantity of material per package

- (i) Activity not to exceed 3,000 times a Type A quantity along with the following limits:
 - (1) The limit determined per the procedure in Attachment 1 to Chapter 7 of the application for beta and gamma emitting radionuclides, except for ICP payloads described in Sections 5.(b)(2)(ix, through xi) of this certificate.
 - (2) The mass limits for fissile materials as prescribed by 10 CFR 71.15 for exempting materials from classification as fissile material, except for ICP payloads described in Sections 5.(b)(2)(ix and x) of this certificate.
 - (3) A maximum total package neutron source of 1×10^5 neutrons/second for materials that produce neutrons (other than fissile materials) through any means, including spontaneous fission, alpha-neutron reactions, and gamma-neutron reactions.
- (ii) Maximum decay heat: 200 watts.
- (iii) Maximum weight of contents: 14,150 pounds including shoring and secondary containers.
- (iv) Powdered or dispersible solid materials must have a mass of at least 60 grams or a specific activity of 50 A₂/g or less.
- (v) Explosives, corrosives, and non-radioactive pyrophorics are prohibited. Pyrophoric radionuclides may be present only in residual amounts less than 1 weight percent.
- (vi) Materials that may auto-ignite or change phase at temperatures below 350°F, not including water, shall not be included in the contents. Also contents shall not include any material that may cause any significant chemical, galvanic, or any other reactions.
- (vii) Powdered 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, e.g., phosphorus.
- (viii) Contents may only include quantities of boron, lithium or beryllium such that these materials do not constitute quantities sufficient to be considered as a bulk material for payload item or a portion of that payload item.
- (ix) Fissile contents for Payload Types 1 and 2 shall be limited to the fissile gram equivalent of 2,200 grams of Pu-239, as determined in Supplement 1 of this certificate.
- (x) Fissile contents for Payload Types 3, 4, and 6 shall be limited to the fissile gram equivalent of 325 grams of Pu-239, as determined in Supplement 1 of this certificate.
- (xi) Maximum contents for Payload Type 5 shall be limited to 229.4 TBq (6,200 Ci) within eight (8) payload drums and 28.675 TBq (775 Ci) per payload drum.

(c) Criticality Safety Index: 0.0

(d) Conditions

- (1) In addition to the requirements of Subparts G and H of 10 CFR Part 71:

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- (i) The package must be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the SAR, Consolidated Revision 11, and Supplements 1 and 2 of this certificate.
- (ii) The packaging must be tested and maintained in accordance with acceptance tests and maintenance program described in the Acceptance Tests and Maintenance Program of Chapter 8 of the SAR, Consolidated Revision 11, and Supplements 1 and 2 of this certificate.
- (2) Except for close fitting contents, shoring must be placed between the secondary containers, or activated components, and the package cavity's walls to prevent both radial and axial movements during transport.
- (3) Flammable gas (hydrogen) concentration is limited to less than 5% in volume. Compliance with this concentration limit is determined by methodology used in NUREG/CR-6673.
- (4) Only DOE elements or persons working under contract to DOE elements shall consign the package for shipment under this certificate.
- (5) NRC or Agreement State licensees shall not consign a DOE certified package for shipment, but can transfer the material on-site to DOE elements or persons working under contract to DOE elements for consignment of the package.
- (6) Transport of fissile material by air is not authorized.
- (7) For Payload Types 1 through 4 and 6, fissile contents 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.
- (8) Revision 3 of the certificate may be used until June 30, 2023

(e) Supplement(s)

- (1) *Idaho Cleanup Project Shipping Addendum for Model 8-120B Type B Shipping Package*, Revision 1, dated May 2017.
- (2) *Transmittal of Supplements A and B to Docket No. 16-38-9168, "Idaho Cleanup Project Shipping Addendum for the Model 8-120B Type B Shipping Package, Updated May 2017 (Rev.1)",* dated July 18, 2017
- (3) *Technical Justification for the Optional Use of the Cask Top Spacer for Payload Types 1 and 3*, Attachment A, dated July 18, 2017
- (4) *ICP Payload Safety Categorization of Components described from the Radioactive Material to inner 8-120B Vessel Wall*, Attachment B, July 18, 2017
- (5) Email, *Subject: 8-120B-1 cask USA/9168/B(U)F-96 (DOE) Rev. 2*, February 1, 2019
- (6) *Request for Renewal of U.S. Department of Energy (DOE) CoC No. 9168 for the Model No. 8-120B Package, Serial Number - S/N 8-120B-1 (24504-01), ES/DOE 22-004*, June 9, 2022.