ENERGY*SOLUTIONS*

2 April, 2010
E&L-037-10

ATTN: Document Control Desk
Director Vonna Ordaz
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Request for Amendment of US Nuclear Regulatory Commission Certificate of Compliance No. 9204 for the Model 10-160B Shipping Cask

Dear Ms. Ordaz:

Energy*Solutions* hereby requests an amendment of the Certificate of Compliance No. 9204. We request the addition of powdered solids to the list of approved waste forms conditioned on the demonstration that the cask is leaktight.

Attached for review are revisions to Chapters 1 and 7 of the SAR. Please revise the CoC to reflect these changes.

Energy*Solutions* also requests this matter be addressed as soon as possible. This amendment is needed to support the National Nuclear Security Administration (NNSA). The NNSA is working to reduce its materials of national security interest footprint by relocating materials to facilities where the materials can be best secured and managed. A 10-160B Cask with powdered solid physical form authorized content is needed to support this effort.

Should you or members of your staff have questions about the request, please contact Mark Whittaker at (803) 758-1898.

Sincerely,

Mirza I Baig
Chief Engineer – Engineering & Licensing

Attachments:
1. 10-160B SAR Revised Chapter One
2. 10-160B SAR Revised Chapter Seven

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NMSS01

1.0 GENERAL INFORMATION

1.1 Introduction

This Safety Analysis Report describes a reusable shipping package designed to protect radioactive material from both normal conditions of transport and hypothetical accident conditions as required by 10CFR71. The package is designated the Model 10-160B package.

1.2 Package Description

1.2.1 Packaging

The package consists of a steel and lead cylindrical shipping cask with a pair of cylindrical foam-filled impact limiters installed on each end. The package configuration is shown in Figure 1-1. Cask assembly drawings are included in Section 1.3. The internal cavity dimensions are 68 inches in diameter and 77 inches high. The cylindrical cask body is comprised of a 2 inch thick external steel shell and a 1 1/8 inch internal steel shell. The annular space between the shells is filled with 1 7/8 inch thickness of lead. The base of the cask consists of a 5½ inch thickness of flat circular steel plates (2½ and 3 inches) which are welded together. The cask primary lid also consists of a 5½ inch thickness flat circular steel plates (2½ and 3 inches) which are welded together. The primary lid is fastened to the cask body with twenty-four, 1 3/4 - 8 UNC bolts. There is a secondary lid in the middle of the primary lid. This secondary lid is attached to the primary lid with twelve, 1 3/4 - 8I UNC bolts. A 12 gauge stainless steel liner (0.105 inches) welded to the cask cavity and lid surface protects all accessible areas from contamination. Also, a steel thermal shield is welded to the exterior barrel of the cask and serves as protection during the fire accident.

The impact limiters are 102 inches in the outside diameter and extend about 12 inches beyond the outside wall of the cask. There is a 47½ inch diameter void at each end. Each limited has an external shell, fabricated from stainless steel which cans the foam and allows it to withstand large plastic deformation without fracturing. The volume inside the shell is filled with a crushable, shock and thermal insulating polyurethane foam. The polyurethane is sprayed into the shell and allowed to expand until the void is completely filled. The foam bonds to the shell, which creates a unitized construction for the impact limiters. The upper and lower impact limiters are held together with eight circumferentially located ratchet binders which secure the limiters to the cask. A general arrangement drawing of the package is included in Appendix 1.3. It shows the package dimensions as well as all materials of construction.

1.2.1.1 Containment Vessel

The containment vessel is defined as the inner steel shell of the cask body together with closure features comprised of the lower surface of the cask lid and the primary and secondary lid bolts.

1.2.1.2 Neutron Absorbers

There are no materials used as neutron absorbers or moderators in the package.

1.2.1.3 Package Weight

Maximum gross weight for the package is 72,000 lbs. including a maximum payload weight of 14,500 lbs.

1.2.1.4 Receptacles

There are no receptacles on this package.

1.2.1.5 Vent, Drain, Test Ports and Pressure Relief Systems

Pressure test ports with manual venting features exist between the twin O-ring seals for both the primary and secondary lids. This facilitate leak testing the package in accordance with ANSI N14.5.

The drain and vent ports are provided with same venting features for venting pressures within the containment cavity, which may be generated during transport, prior to lid removal. Each port is sealed with an elastomer gasket. Specification information for all seals and gaskets is contained in Chapter 3.

1.2.1.6 Lifting Devices

Lifting devices are a structural part of the package. The General Arrangement Drawing in Appendix 1.3 shows two lifting lugs provided for removal and handling of the cask. Three lid lifting lugs are used for removal and handling of the secondary and primary lid. Refer to Section 2.4.3 for a detailed analysis of the structural integrity of the lifting devices.

1.2.1.7 Tie-downs

From the General Arrangement Drawing shown in Appendix 1.3, it can be seen that the tie-down arms are an integral part of the external cask shell. Consequently, tie-down arms are considered a structural part of the package. Refer to Section 2.4.4 for a detailed analysis of the structural integrity of the tie-down arms.

1.2.1.8 Heat Dissipation

There are no special devices used for the transfer or dissipation of heat.

1.2.1.9 Coolants

There are no coolants involved.

1.2.1.10 Protrusions

There are no outer or inner protrusions except for the tie-down arms described above.

1.2.1.11 Shielding

Cask walls provide a shield thickness of 1 7/8 inches of lead and 3 inches of steel. Cask ends provide a minimum of 5 inches of steel. The contents will be limited such that the radiological shielding provided (nominally 3¼ inches lead equivalent based on Co-60) will assure compliance with DOT and IAEA regulatory requirements.

An optional, removable steel insert may be installed inside the cask to provide additional shoring and shielding for the cask contents. The insert fits closely to the inside walls of the cask, but is not attached to the cask nor the contents. It may vary in thickness between ½ inch and 1½ inch on the sides, and is open on the top and bottom. It is approximately ½ inch shorter than the cask cavity.

1.2.2 Operational Features

Refer to the General Arrangement Drawing of the package in Appendix 1.3. There are no complex operational requirements associated with this package.

1.2.3 Contents of Packaging

1.2.3.1 Cask Contents

The contents of the cask will consist of:

1) Greater than Type A quantities (up to a maximum of 3000 A_2) of radioactive material in the form of solids or dewatered materials in secondary containers.

2) Greater than Type A quantities (up to a maximum of 3000 A_2) of radioactive material in the form of activated reactor components or segments of components of waste from a nuclear power plant.

3) That quantity of any radioactive material which does not exceed 3000 A_2 and which does not generate spontaneously more than 200 thermal watts of radioactive decay heat.

4) The weight of the contents in the cask cavity will be limited to 14,500 lbs. If an insert is installed in the cavity, the maximum payload is reduced by the weight of the insert.

5) Transuranic Waste (TRU) with not more than 325 fissile gram equivalents (FGE) of fissile radioactive material up to a maximum of 3000 A_2.

1.2.3.2 Waste Forms

The type and form of waste material will include:

1) By-product, source, or special nuclear material consisting of process solids or resins, either dewatered, solid, or solidified in secondary containers. (See Section 4.2.1 for specific limitations). Contents containing greater than 20 Ci of plutonium must be in solid form.

2) Neutron activated metals or metal oxides in solid form.

3) Miscellaneous radioactive solid waste materials, including special form materials and powdered solids. Powdered solids shipments shall be performed only when the most recent periodic leak test meets the requirements of Chapter 4, Section 4.9.

4) TRU wastes are limited as described in Appendix 4.10.2, Transuranic (TRU) Waste Compliance Methodology for Hydrogen Gas Generation. 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.

10-160B GENERAL ARRANGEMENT

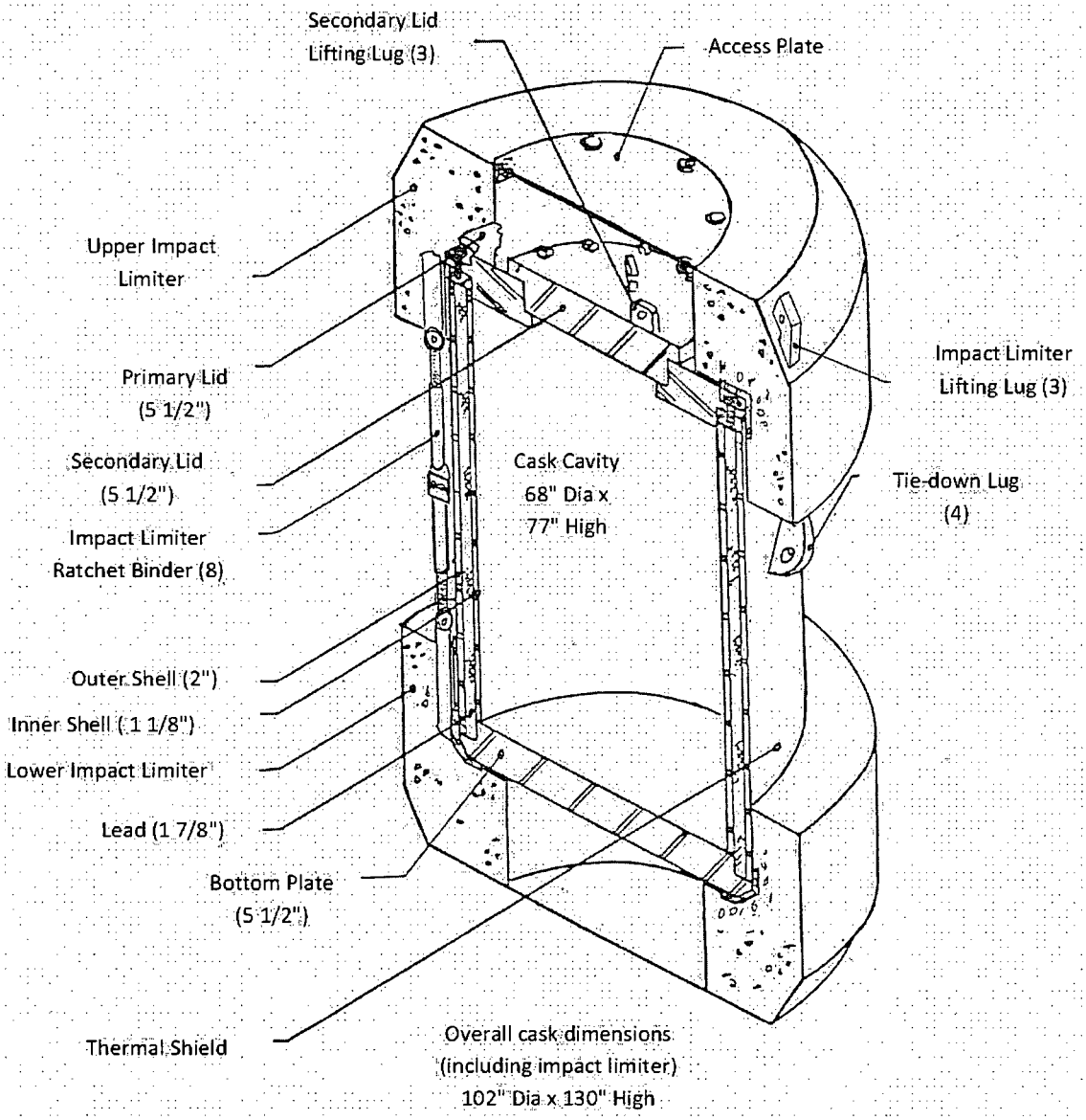

Figure 1-1

1.3 Appendix

10-160B Shipping Cask Drawing

(withheld as security-related sensitive information)

7.0 OPERATING PROCEDURE

This chapter describes the general procedure for loading and unloading of the 10-160B cask.

An optional steel insert may be used to shield the contents of the cask. The appropriate thickness of insert that should be used is determined from calculations and experience with previous, similar shipments. However, the insert must be thick enough so that dose rates on the exterior of the cask do not exceed the limits of 10 CFR 71.47, but must be no thicker than the maximum permissible size described in section 1.0.

The maximum permissible payload of the cask is 14,500 pounds, including contents, secondary containers, shoring, and optional steel insert (if used).

For contents that could radiolytically generate combustible gases, the criteria of Section 4.8 must be addressed. For DOE TRU waste, compliance with the 5% hydrogen concentration limit shall be demonstrated by the methods discussed in Appendix 4.10.2. For other contents, which exceed the 5% concentration limit, the procedures in Section 7.4 can be used to satisfy the criteria of Section 4.8.

Powdered solids shipments require the cask to be leaktight. The most recent periodic leak test must meet the requirements of Chapter 4, Section 4.9, Periodic Verification Leak Rate Determination for Leaktight Status.

7.1 Procedure for Loading the Package

7.1.1 Determine if cask must be removed from trailer for loading purposes. To remove cask from trailer:

7.1.1.1 Loosen and disconnect ratchet binders from upper impact limiter.

7.1.1.2 Using suitable lifting equipment, remove upper impact limiter. Care should be taken to prevent damage to impact limiter during handling and storage.

7.1.1.3 Disconnect cask to trailer tie-down equipment.

7.1.1.4 Attach cask lifting ears and torque bolts to 200 ft-lbs $\pm$ 20 ft-lbs lubricated.

7.1.1.5 Using suitable lifting equipment, remove cask from trailer and lower impact limiter and place cask in level loading position.

NOTE **THE CABLES USED FOR LIFTING THE CASK MUST HAVE A TRUE ANGLE, WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 60°.**

7.1.2 Loosen and remove the twenty-four bolts (24, 1¾" – 8 UN) which secure the primary lid to cask body.

7.1.3 Remove primary lid from cask body using suitable lifting equipment and the three lifting lugs on the secondary lid. Care should be taken during lid handling operations to prevent damage to cask or lid seal surfaces.

NOTE **THE CABLES USED FOR LIFTING THE LID MUST HAVE A TRUE ANGLE, WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 45°.**

NOTE **IN CERTAIN CIRCUMSTANCES, LOADING MAY BE ACCOMPLISHED THROUGH THE SECONDARY LID AND THE PRIMARY LID WILL REMAIN ON. IN THIS CASE, THE FOLLOWING ALTERNATE (A) STEPS WILL BE USED:**

7.1.1.A (ALTERNATE) REMOVE THE IMPACT LIMITER CENTER COVER PLATE. THIS WILL PROVIDE ACCESS TO THE SECONDARY LID AND LIFTING LUGS.

7.1.2.A (ALTERNATE) WORKING THROUGH THE CENTER HOLE IN THE UPPER IMPACT LIMITER, LOOSEN AND REMOVE THE 12 1¾" – 8 UN LID BOLTS WHICH SECURE THE SECONDARY LID TO THE PRIMARY LID.

7.1.3.A (ALTERNATE) REMOVE THE SECONDARY LID USING SUITABLE LIFTING EQUIPMENT AND THE THREE LUGS ON THE LID. CARE SHOULD BE TAKEN DURING LID HANDLING

7.1.4 Visually inspect accessible areas of the cask interior for damage, loose materials, or moisture. Clean and inspect seal surfaces. Replace seals when defects or damage is noted which may preclude proper sealing.

NOTE **RADIOACTIVELY CONTAMINATED LIQUIDS MAY BE PUMPED OUT, REMOVED BY USE OF AN ABSORBENT MATERIAL, OR VIA DRAIN LINE. REMOVAL OF ANY MATERIAL FLOW INSIDE THE CASK SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED HEALTH PHYSICS (HP) PERSONNEL WITH THE NECESSARY HP MONITORING AND RADIOLOGICAL HEALTH SAFETY PRECAUTIONS AND SAFEGUARDS.**

NOTE **WHEN SEALS ARE REPLACED (INCLUDING SEALS ON THE OPTIONAL VENT AND DRAIN PORTS), LEAK TESTING IS REQUIRED AS SPECIFIED IN SECTION 8.2.2.1.**

7.1.5 Check the torques on the cavity vent and drain line cap screws to determine that the cap screws are properly installed using O-rings. This step is not required if the cask does not have the optional vent and drain lines, or if the tamper seals on the vent or drain lines have not been removed. Torque the cap screws to 20 ± 2 ft-lbs.

7.1.6 Place radwaste material, disposable liners, drums, or other containers into cask and install shoring or bracing, if necessary to restrict movement of contents during transport.

7.1.7 Clean and inspect lid seal surfaces.

7.1.8 Replace the primary lid and secure the lid to the cask body by installing the 24 lid bolts. Ensure that the lid orientation stripe is in alignment with the cask stripe. Torque bolts to 300 ± 30 ft-lbs.

7.1.8.A (Alternate) Replace secondary lid (if removed) and secure to the primary lid with 12 bolts. Ensure that the lid orientation stripe is in alignment with the stripe on the primary lid. Torque the bolts to 300 ± 30 ft-lbs.

NOTE **PERFORM PRESSURE DROP LEAK TEST OF THE CASK PRIMARY LID, SECONDARY LID, VENT LINE, OR DRAIN LINE (AS APPLICABLE) IN ACCORDANCE WITH SECTION 8.2.2.2 PRIOR TO SHIPMENT OF PACKAGE LOADED WITH LARGE QUANTITIES OF LSA MATERIALS OR TYPE B QUANTITIES OF NON-LSA MATERIAL.**

7.1.9 Install anti-tamper seals to the designated lid bolts, or to vent and/or drain line plugs (if applicable).

7.1.10 If cask has been removed from trailer, proceed as follows to return cask to trailer:

7.1.10.1 Using suitable lifting equipment, lift and position cask into lower impact limiter on trailer in the same orientation as removed.

7.1.10.2 Unbolt and remove cask lifting ears.

7.1.10.3 Reconnect cask to trailer using tie-down equipment.

7.1.11 Using suitable lifting equipment, lift, inspect for damage and install upper impact limiter on cask in the same orientation as removed.

7.1.12 Attach and hand tighten ratchet binders between upper and lower impact limiters.

7.1.13 Cover lift lugs as required.

7.1.14 Install anti-tamper seals to the designated ratchet binder.

7.1.15 Replace center plate on the upper impact limiter.

7.1.16 Inspect package for proper placards and labeling.

7.1.17 Complete required shipping documentation.

7.1.18 Prior to shipment of a loaded package the following shall be confirmed:

(a) That the licensee who expects to receive the package containing materials in excess of Type A quantities specified in 10 CFR 20.1906(b) meets and follows the requirements of 10 CFR 20.1906 as applicable.

(b) That trailer placarding and cask labeling meet DOT specifications (49 CRF 172).

(c) That the external radiation dose rates of the 10-160B are less than or equal to 200 millirem per hour (mrem/hr) at the surface and less than or equal to 10 mrem/hr at 2 meters in accordance with 10 CFR 71.47.

(d) That all anti-tamper seals are properly installed.

(e) For powdered solids shipments, the most recent periodic leak test demonstrated the cask was leaktight.

7.2 Procedure for Unloading Package

In addition to the following sequence of events for unloading a package, packages containing quantities of radioactive material in excess of Type A quantities specified in 10 CFR 20.1906(b) shall be received, monitored, and handled by the licensee receiving the package in accordance with the requirements of 10 CFR 20.1906 as applicable.

7.2.1 Move the unopened package to an appropriate level unloading area.

7.2.2 Perform an external examination of the unopened package. Record any significant observations.

7.2.3 Remove anti-tamper seals.

7.2.4 Loosen and disconnect ratchet binders from the upper overpack assembly.

7.2.5 Remove upper overpack assembly using caution not to damage the cask or overpack assembly.

7.2.6 If cask must be removed from trailer, refer to Step 7.1.1.

7.2.7 (Optional if vent port installed). Vent cask cavity removing plugs from the vent line.

7.2.8 Loosen and remove the twenty-four (24) 1¾" – 8 UN primary lid bolts.

7.2.9 Using suitable lifting equipment, lift lid from cask using care during handling operations to prevent damage to cask and lid seal surfaces.

NOTE: THE CABLES USED FOR LIFTING THE LID MUST HAVE A TRUE ANGLE WITH RESPECT TO THE HORIZONTAL OF NOT LESS THAN 45°.

7.2.10 Remove contents to disposal area.

NOTE: RADIOACTIVELY CONTAMINATED LIQUIDS MAY BE PUMPED OUT, REMOVED BY USE OF AN ABSORBENT MATERIAL, OR VIA DRAIN LINE. REMOVAL OF ANY MATERIAL FROM INSIDE THE CASK SHALL BE PERFORMED UNDER THE SUPERVISION OF QUALIFIED HEALTH PHYSICS (HP) PERSONNEL WITH THE NECESSARY HP MONITORING AND RADIOLOGICAL HEALTH SAFETY PRECAUTIONS AND SAFEGUARDS.

7.2.11 Assemble package in accordance with loading procedure (7.1.7 through 7.1.17).

7.3 Preparation of Empty Packages for Transport

The Model 10-160B cask requires no special transport preparation when empty. Loading and unloading procedures outlined in this chapter shall be followed as applicable for empty packages. The requirements of 49 CFR 173.428 shall be complied with.

NOTE: EACH PACKAGE USER WILL BE SUPPLIED WITH A COMPLETE DETAILED OPERATING PROCEDURE FOR USE WITH THE PACKAGE.

7.4 Procedures for Shipment of Packages Which Generate Combustible Gases

Procedures for preparing packages for shipment which radiolytically generate combustible gases are outlined below. These procedures are divided into two categories:

a. Combustible gas control by inerting, and

b. Combustible gas suppression.

7.4.1 Combustible Gas Control by Inerting

7.4.1.1 Dewater the secondary container. The bulk of the free water is removed from the secondary container by displacing the water with nitrogen gas.

7.4.1.2 Inert the secondary container (and, if necessary, the cask). The inerting operation is done at the dewatering station just before the cask is loaded. Inerting is performed if the hydrogen generated will be greater than 5% in any portion of the package for a time period that is twice the expected shipping time. Inerting is intended to limit the oxygen concentration to less than 5% including any oxygen that is radiolytically generated over the same period considered for hydrogen generation. If a leak path can develop

between the secondary container and the cask, the cask will also be inerted.

7.4.1.3 Inerting of the secondary container and / or the cask cavity, to achieve an oxygen concentration of less than 5%, can be performed per the following:

- Connect a nitrogen supply.
- Pressurize with nitrogen to 15 ±1 psig. for fifteen minutes.
- Depressurize to ~ 0 psig.
- Repeat this pressurization / depressurization cycle two more times

7.4.2 Combustible Gas Suppression

7.4.2.1 Dewater the secondary container. See paragraph 7.4.1.1.

7.4.2.2 Install the previously qualified* combustible gas suppression system (e.g., a vapor pressure catalytic recombiner).

*Previous qualification means that the catalytic recombiner design to be used has been tested for a period of twice the expected shipping time under conditions expected in transport and has proven satisfactory.

7.4.2.3 Sample the gas in the secondary container and measure static pressure. This will assure that the combustible gas control method is working properly and that the combustible gas criteria specified in Section 4.4 will be met.

7.4.2.4 Load the secondary container.