

7.0 PACKAGE OPERATIONS

This Section describes the procedures to be used for loading and unloading the 3-60B cask. These procedures are intended to ensure the cask is prepared for transport and generally operated in a manner consistent with SAR Sections 1 through 6, and that exposure to radiation by operating personnel is minimized. The operating procedures in this Section are presented generally in the order of performance, but deviations to this sequence are permitted based on facility operational needs or requirements. Actual operations will be conducted using detailed procedures and calibrated equipment as appropriate that are consistent with this Section.

7.1 PACKAGE LOADING

Cask loading may be performed either in a pool (“wet”) or in cask loading area (“dry”). Cask unloading is normally performed “dry” – typically at a licensed burial facility.

7.1.1 Preparation for Loading

- 7.1.1.1 Inspect the package to ensure there is no damage to the exterior that will impair its ability to function as intended.
- 7.1.1.2 Remove the impact limiter lifting lug covers and detach each impact limiter from the cask body. Using lifting equipment remove each impact limiter.
- 7.1.1.3 Disconnect the front and rear trunnion tie down equipment.
- 7.1.1.4 Attach lifting equipment to the lifting trunnions and remove the packaging from the shipping cradle. Place the cask in the loading area (dry loading) or preparation area (wet loading). If necessary, clean the exterior surfaces.
- 7.1.1.5 Remove the vent port. Inspect the O-rings and replace them if defects are found that are severe enough to prevent proper sealing.

Note: When O-rings are replaced, leak testing is required as specified in Section 8.2.2.1.

- 7.1.1.6 Remove the lid bolts and attach the lifting attachments to the lid.
- 7.1.1.7 Install lid alignment pins in the appropriate lid bolt holes.
- 7.1.1.8 Remove the lid from the cask.
- 7.1.1.9 Inspect the lid O-rings and replace them if defects are found that are severe enough to prevent proper sealing. Inspect the bolts and sealing surfaces for damage or defects and clean as necessary. Replace any components when defects or damage is found that will preclude proper sealing.

Note: When O-rings are replaced, leak testing is required as specified in Section 8.2.2.1.

7.1.1.10 Dry Loading

- a. Inspect accessible areas of the cavity for damage, loose materials, or moisture.
- b. Drain port may be removed if necessary. Inspect the seals if removed and replace them if defects are found that are severe enough to prevent proper sealing.

Note: When seals are replaced in the vent or drain port, leak testing is required as specified in Section 8.2.2.1.

7.1.1.11 Wet Loading

- a. Remove the drain port plug. Inspect the seals and replace if defects are found that are severe enough to prevent proper sealing.

Note: When seals are replaced, leak testing is required as specified in Section 8.2.2.1.

- b. Attach lifting equipment to the upper trunnion and lower the cask into pool.

Note: Precautions may be taken to minimize possible spread of contamination, such as first filling the cavity with clean water or rinsing the sides of the cask with clean water as it is lowered into the pool.

- c. Remove the lifting equipment.

7.1.2 Loading of Contents

7.1.2.1 Verify intended contents meet the requirements of the Certificate of Compliance for the 3-60B.

7.1.2.2 Load the contents into the cavity.

Note. Shoring may be used as necessary to minimize movement of contents during transport. Shoring weight must be accounted for as part of the cask contents weight limit.

7.1.2.3 Dry Loading. .

- a. Attach lifting equipment to the closure lid and lower closure lid onto the cask. Survey the cask for safe radiation levels and inspect the lid for proper seating.
- b. Install two or more lid bolts hand tight.
- c. Go to Step 7.1.2.5

7.1.2.4 Wet Loading.

- a. Attach lifting equipment to the closure lid and lower closure lid onto the cask. Visually verify proper lid installation.
- b. Install two or more lid bolts hand tight.
- c. Attach lifting equipment and lift the cask until it clears the surface of the pool. Survey the cask for safe radiation levels and inspect the lid for proper seating. Leave the cask suspended and allow water to drain from the cavity. The cask exterior may be rinsed with demineralized water while it is suspended over the pool.
- d. Place the cask vertically in the preparation area.
- e. Remove the lifting and handling equipment from the cask lifting trunnions.

7.1.2.5 Re-install the vent port and drain port plugs. Torque the drain port plug and vent port bolts to 20 ± 2 ft-lbs (lubricated).

7.1.2.6 Remove the alignment pins from the lid bolt holes.

7.1.2.7 Install the remaining lid closure bolts handtight. Torque all bolts to 150 ± 15 ft-lbs (lubricated) using industry practice. Torque all bolt to 300 ± 30 ft-lbs (lubricated) using industry practice.

7.1.2.8 Decontaminate the exterior surfaces of the cask as necessary.

7.1.3 Preparation for Transport

7.1.3.1 Pre-shipment leak tests of the cask lid, vent port, and drain port plug shall be performed in accordance with the requirements and procedures in Section 8.2.2.2.

7.1.3.2 Attach lifting and handling equipment to the cask lifting trunnions, move the cask to the conveyance loading area, and mount the cask in its shipping cradle on the transport trailer.

- 7.1.3.3 Attach the impact limiters to the cask. Torque impact limiter attachment bolts to 75 ± 7 ft-lbs (lubricated).
- 7.1.3.4 Install impact limiter lifting lug covers.
- 7.1.3.5 Attach the security seals to the cask as required.
- 7.1.3.6 Re-install front and rear trunnion tie-down equipment.
- 7.1.3.7 Verify that external radiation and contamination levels do not exceed the limits of 49 CFR 173.441 or .443.
- 7.1.3.8 Verify that the exterior surface of the package does not exceed the temperature limits specified in 49CFR173.442.

7.2 PACKAGE UNLOADING

Packages containing radioactive material in excess of Type A quantities shall be received, monitored, and handled by the licensee receiving the package in accordance with requirements in 10CFR20.1906 as applicable.

7.2.1 Receipt of Package from Carrier

- 7.2.1.9 Inspect the package to ensure there is no damage to the exterior that will impair its ability to function as intended. Perform a radiation and contamination survey of the exterior. Verify that the security seals are still attached.
- 7.2.1.10 Remove the impact limiter lifting lug covers and detach each impact limiter from the cask body. Using lifting equipment remove each impact limiter from the package.
- 7.2.1.11 Disconnect the front and rear trunnion tie down equipment.
- 7.2.1.12 The cask can be removed from the shipping cradle in either the vertical or horizontal orientation. If removed in the vertical orientation, the lifting equipment is to be attached to the lifting trunnions. If it is removed in the horizontal orientation, attach the lifting equipment to all four trunnions.
- 7.2.1.13 Place the cask in the work area in either the vertical or horizontal orientation.

7.2.2 Removal of Contents

- 7.2.2.1 (Optional Step). Open the vent port in the cask lid. Precautions must be taken to protect personnel opening the port from gases escaping while it is being opened.
- 7.2.2.2 Loosen the lid bolts and remove the lid.
- 7.2.2.3 Remove the contents from the cavity.
- 7.2.2.4 The cask may be removed from service for maintenance or other purposes, or it may be reassembled per steps 7.1 or 7.3.

7.3 PREPARATION OF AN EMPTY PACKAGE FOR TRANSPORT

7.3.1 Prior Conditions

The following conditions shall be confirmed prior to shipping an empty 3-60B packaging:

- 7.3.1.1 The requirements of 49CFR173.428 are met.
- 7.3.1.2 The cavity is empty of contents as far as practicable.
- 7.3.1.3 The packaging is securely closed.
- 7.3.1.4 The exterior has been inspected and confirmed to be unimpaired.

7.3.2 Special Preparations

No special preparations or procedures are required for transporting the 3-60B empty, other than the above requirements are met. Loading and unloading procedures in 7.1 and 7.2 shall be followed.

7.4 OTHER OPERATIONS

7.4.1 Procedures for Shipment of Packages Which Generate Combustible Gases

Procedures for preparing packages for shipment which radiolytically generate combustible gases are outlined below:

7.4.1.5 Combustible Gas Control by Inerting

- a. Dewater the secondary container. The bulk of the free water is removed from the secondary container by displacing the water with nitrogen gas.
- b. 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.
- c. 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