

SHIPPING PACKAGE ASSEMBLY/DISASSEMBLYGeneric Model 1500 Type B Shipping Package
Loading Procedure1. Purpose

To provide container users with the recommended procedure for loading the Model 1500 Type B shipping container and the preparation of the package assembly for shipment.

2. Scope

This procedure establishes the guidelines to be followed for the handling activities associated with the GE-VNC supplied shipping package. VARIANCES TO THESE GUIDELINES ARE PERMISSIBLE PROVIDED THEY ARE IN COMPLIANCE WITH THE APPLICABLE REQUIREMENTS OF THE SHIPPING PACKAGE CERTIFICATE OF COMPLIANCE, THE RECEIVING FACILITY LICENSES, AND DOT/NRC REGULATIONS. Internal facility operating procedures should be followed for the "routine" transfers, movements, decontamination, radiation controls, etc. of the shipping package.

The procedure is applicable to the Model 1500 Type B shipping container.

3. Special Requirements

- a. A copy of this procedure should accompany or precede the first shipping package sent to a user for receiving and shipping radioactive materials.
- b. The silicone rubber lid gaskets must be replaced within the 12-month period preceding each shipment. Prior to each shipment the silicone rubber lid gaskets must be inspected. The silicone rubber gasket must be replaced if inspection shows any defects. Cavity drain line must be sealed with appropriate sealant applied to threads to pipe plug.
- c. The packaging shall be bubble tested within the 12-month period preceding each shipment, and after each third use. The bubble test shall be performed by filling the cask cavity to approximately 1/4-inch depth with water, reducing the cavity pressure to no more than 2.5 psia and holding for at least 5 minutes. Acceptance is indicated by no continuous generation of bubbles.

4. Special Notes

- a. The protective jacket and the exterior of the shipping cask are free of smearable radioactive contamination when shipped. The package should be return shipped in the same contamination-free condition.
- b. NO MODIFICATION, REPLACEMENT, REPAIR, OR REWORK TO THE SHIPPING PACKAGE (PROTECTIVE JACKET AND CASK) SHALL BE MADE WITHOUT WRITTEN PERMISSION FROM (GE-VNC) IRRADIATION PROCESSING OPERATION, PLEASANTON, CALIFORNIA.
- c. All package components (except product and non-returnable product container) must be returned unless otherwise specified by GE-VNC.
- d. The cask cavity shall be leak checked per the requirements of the Certificate of Compliance.
- e. A "Model 1500 Shielded Container" diagram, VAL 72XX, is attached and should be used to locate items referenced in the text of this procedure.
- f. Do NOT attempt to lift the cask by the eye (Item 1) on the cask lid. The eye is for lifting the cask lid only. The cask lid weight is stamped in the lid.
- g. ONLY THE TIEDOWN EYES (ITEM 3) ON THE SIDE OF THE FIRESHIELD ARE APPROVED TO SECURE THE PACKAGE ASSEMBLY TO THE TRANSPORT VEHICLE. TWO ADDITIONAL CHAINS TO SECURE FIRESHIELD PALLET TO VEHICLE ARE RECOMMENDED. OTHER TIEDOWN ROPING, CABLING, OR CHAINING ARRANGEMENT, USING THE TIEDOWN EYES (ITEM 3) MAY BE USED PROVIDING THE SHIPPER PERFORMS AN ENGINEERING ANALYSIS AND EVALUATION.
- h. Do NOT lift the protective jacket and cask package assembly by the top rectangular holes (Item 2) on protective jacket. These are only for moving the protective jacket after it has been unbolted from the base (pallet).
- i. The lugs (Item 3) located on the side of the protective jacket are for tie-downs during transport and may be used to lift the entire protective jacket/cask package assembly.
- j. The lifting eyes (rectangular holes) on the protective jacket must be secured with the anti-tie-down covers (Item 4) to prevent use as a tie-down system during transport. THE PROTECTIVE JACKET LIFTING EYES ARE NOT APPROVED TO SECURE PACKAGE ASSEMBLY TO TRANSPORT VEHICLE.

5. Protective Jacket Disassembly

- a. Use appropriate capacity material handling equipment to place complete package assembly in an area free of radioactive contamination. Package gross weight is on the protective jacket nameplate. (Item 5 on attached diagram).
- b. Monitor the exterior container surface for radioactive contamination and dose rate with appropriate radiation detection instruments. Notify the Area Supervisor, Regulatory Compliance, or other designated personnel if the container surface is contaminated or the dose rate is higher than indicated on the shipping papers.
- c. Verify security seal number with shipping documents. Remove the security seal (Item 6 on attached diagram).
- d. Unscrew and remove the bolts (Item 7 on attached diagram) from the base of the protective jacket. Use care not to damage or lose the bolts.
ALL THE BOLTS WILL BE REQUIRED FOR REASSEMBLY.
- e. Carefully lift the protective jacket off the cask, either by using the rectangular holes (Item 2) on top of the jacket or by using the lug tie-down ears (Item 3) and appropriately rated slings. The protective jacket must be lifted straight up to prevent damage to cask.
- f. Place the protective jacket in a noncontaminated area or cover to protect from radioactive contamination.
- g. Monitor the cask dose rate with an appropriate radiation detection instrument.
- h. Smear the cask surface to check for radioactive contamination. If contamination is detected, notify Area Supervisor and follow appropriate internal procedures for contamination control and decontamination activities.
- i. Lift the cask off protective jacket base using the ears (Item 8) on each side of the cask. **DO NOT LIFT CASK USING EYE IN THE CASK LID. THE CASK LID EYE IS AUTHORIZED FOR LIFTING THE LID ONLY.** Transport the cask to the shielded work area. The cask weight is on the cask nameplate. Do NOT overload the material transport equipment.

6. Loading Casks - Dry Remote Operation

- a. Use appropriate material handling equipment and position the cask on stable foundation in a shielded remote handling facility. Follow appropriate internal procedures for dose rate monitoring and respiratory protection requirements.
- b. Perform required cavity leak check prior to loading cask. Leak tests shall be as designated in the cask Certificate of Compliance.
- c. If materials to be loaded into the cask are free of radioactive contamination - sealed source container; special form containment, etc.:
 - 1) Before removal of the cask lid, be sure that all remote handling tools to be used are as free of contamination as the item(s) being loaded.
 - 2) Remove the cask lid bolts (Item 9). Place the bolts in a convenient location so they are not lost, damaged, or contaminated. **ALL THE BOLTS WILL BE REQUIRED FOR REASSEMBLY.**
 - 3) Use an appropriately rated lifting device to remotely remove the cask lid. The cask lid weight is stamped on the lid.
 - 4) Smear the cask cavity for radioactive contamination. Clean to the required levels per appropriate internal procedures.
 - 5) Check the cask drain line. Remove previous thread sealant and apply Teflon tape or other thread sealant to the drain plug threads. Replace the drain plug and tighten.
 - 6) Visually check the gasket and cask and lid sealing surfaces for cuts, nicks, tears, ragged edges or other defects that could adversely affect the sealing ability of the gasket. The gasket shall be replaced if any defects are indicated.
 - 7) Visually inspect the cask lid bolts for obvious damage. **IF ANY COMPONENT OF THE SHIPPING PACKAGE REQUIRES REPAIR OR REPLACEMENT, NOTIFY GE-VNC.**
 - 8) Properly position the gasket.
 - 9) Remotely transfer the materials into the cask cavity. A lifting eye or bail should be on the container or material.
 - 10) Replace the cask lid and bolts. Tighten the lid bolts to 120 ± 10 ft-lbs torque in a criss-cross pattern.

- d. If materials to be loaded into the cask are Normal Form materials:
- 1) Remove the cask lid bolts (Item 9). Place bolts in a convenient location so they are not lost, damaged, or contaminated. **ALL THE BOLTS WILL BE REQUIRED FOR REASSEMBLY.**
 - 2) Use an appropriately rated lifting device to carefully remove the cask lid. The cask lid weight is stamped on the lid.
 - 3) Smear the cask cavity for radioactive contamination. Decontaminate to the required levels per appropriate internal procedures.
 - 4) Check the cask drain line. Remove previous thread sealant and apply Teflon tape or other thread sealant to the drain plug threads. Replace the drain plug and tighten.
 - 5) Visually check the gasket and cask and lid sealing surfaces for cuts, nicks, tears, jagged edges or other defects that could adversely affect the sealing ability of the gasket. The gasket shall be replaced if any defects are indicated.
 - 6) Visually inspect the cask lid bolts for obvious damage. **IF ANY COMPONENT OF THE SHIPPING PACKAGE REQUIRES REPAIR OR REPLACEMENT, NOTIFY GE-VNC.**
 - 7) Properly position the gasket.
 - 8) Remotely transfer materials into the cask cavity. A lifting bail or eye should be on the material or transfer container.
 - 9) Replace the cask lid and bolts. Tighten the lid bolts to 120 ± 10 ft-lbs torque in a criss-cross pattern.

7. Loading Casks - Wet Operation

- a. Use appropriate material handling equipment and position the cask on stable foundation. Follow appropriate internal procedures for dose rate monitoring and respiratory protection requirements.
- b. Perform required cavity leak check prior to loading cask. Leak tests shall be as designated in the cask Certificate of Compliance.
- c. Use shackle bolts mounted through holes (Item 11) in cask lifting ears for crane hook attachment points. Use an overhead crane for raising and lowering the cask.
- d. The cask weight is on the cask nameplate - do not exceed capacity of material handling equipment.

- e. Attach the crane hook or appropriate length sling to eye in cask lid for underwater lid removal. The cask lid weight is stamped on the lid. Use appropriately rated material handling equipment.
- f. Prepare the cask for lowering into the pool. Remove the lid bolts and drain plug (Item 10). CAUTION: DO NOT MOVE THE CASK ANY MORE THAN NECESSARY WITH LID BOLTS REMOVED.
- g. Place the bolts and drain plug in convenient location so they won't be lost, contaminated, or damaged. ALL BOLTS AND DRAIN PLUG WILL BE REQUIRED FOR REASSEMBLY.
- h. Visually inspect the gasket and the cask and lid sealing surfaces for cuts, nicks, tears, jagged edges, or other defects that could adversely affect the sealing ability of the gasket. The gasket shall be replaced if any defects are indicated.
- i. Visually inspect the cask lid bolts and drain plug for obvious damage. IF ANY COMPONENT OF THE SHIPPING PACKAGE REQUIRES REPAIR OR REPLACEMENT, NOTIFY GE-VNC.
- j. Slowly lower the cask into water to sufficient depth to insure safe radiation operating conditions for cask loading personnel. The cask should be lowered slowly to permit the cask cavity to fill with water slowly to prevent large air bubbles escaping from cavity and to prevent dislodging the cask gasket.
- k. If materials to be loaded into the cask are free of contamination - sealed source container, etc.
 - 1) Before loading cask, be sure that all remote pool tools are as free of contamination as item(s) being loaded.
 - 2) Slowly raise the cask lid. Monitor dose rate to working personnel. If cask cavity isn't completely full of water, air bubbles may escape when the lid is removed. Respiratory protection is recommended.
 - 3) Transfer the materials into the cask using the lifting eye or bail on the container or material. Use care to not dislodge cavity gasket.
 - 4) Remotely check the position the cask gasket and carefully replace the cask lid.

- 5) Slowly remove the cask from the water. Drain all the water from cask cavity over the pool or transfer cask to decon area to drain cavity.
 - 6) Water may drain slowly from cask cavity due to the cask lid seal. The cask lid may have to be raised slightly for venting to allow all water to drain from the cask cavity. Raise cask lid carefully and monitor radiation dose rate. The cask lid should be raised only enough to vent cask cavity.
 - **| 7) Tighten the lid bolts to 120 ± 10 ft-lb. torque in a criss-cross pattern.
 - 8) Assure the cask cavity is empty of water using a vacuum drying technique described in Attachment I, Vacuum Drying Procedure.
 - 9) Dry the cask exterior.
 - **| 10) Leak test the cavity using method capable of detecting a leak of 10^{-3} atm-cm³/s at STP.
 - 11) Move the cask to stable foundation.
 - 12) Check the cask drain line. Remove previous thread sealant and apply Teflon tape or other thread sealant to the drain plug threads. Replace the drain plug and tighten.
 - **| 13) Retighten the lid bolts to 120 ± 10 ft-lb. torque in a criss-cross pattern.
1. If materials to be loaded into cask are Normal Form materials:
- 1) Slowly raise the cask lid. Monitor dose rate to working personnel. If cask cavity isn't completely full of water, air bubbles may escape when lid is removed. Respiratory protection is recommended.
 - 2) Transfer the material into the cask using the lifting eye or bail on the material or the container. Use care not to dislodge cavity gasket.
 - 3) Remotely check the position of the cask gasket and carefully replace the cask lid.
 - 4) Slowly remove the cask from the water. Drain all water from the cask cavity over the pool or transfer cask to decon area to drain cavity.
 - 5) Water may drain slowly from cask cavity due to the cask lid seal. The cask lid may have to be raised slightly for venting to allow all the water to drain from the cask cavity. Raise cask lid carefully and monitor radiation dose rate. The cask lid should be raised only enough to vent cask cavity.

- **| 6) Tighten the lid bolts to 120 ± 10 ft-lb. torque in a criss-cross pattern.
- 7) Assure the cask cavity is empty of water using a vacuum drying technique described in Attachment I, Vacuum Drying Procedure.
- 8) Dry the cask exterior.
- 9) Move the cask to a stable foundation.
- 10) Check the cask drain line. Remove previous thread sealant and apply Teflon tape or other thread sealant to the drain plug threads. Replace the drain plug and tighten.
- **| 11) Retighten the lid bolts to 120 ± 10 ft-lb. torque in a criss-cross pattern.
- 12) Leak test the cavity using method capable of detecting a leak of 10^{-3} atm-cm³/s at STP.

8. Reassembly and Return Shipment

- a. Decontaminate cask exterior and survey for smearable radioactive contamination. Cask exterior should be < 100 cpm beta/gamma per ft² and < 200 dpm alpha per ft² or must comply with DOT regulations.
- b. Remove any old labels from cask exterior and apply a "FULL" label. Labeling the cask is an optional step.
- c. Visually inspect the cask ears for bending, cracked welds, or other defects. **NOTIFY GE-VNC IF ANY ABNORMAL CONDITION IS DETECTED.**
- d. Return the full cask to the protective jacket storage area.
- e. Remove any old labels from protective jacket exterior.
- f. Visually inspect protective jacket for damage. **NOTIFY GE-VNC IF ANY DAMAGE REQUIRING REPAIR IS DETECTED.**
 - 1) Check protective skirt for damage.
 - 2) Check fireshield bolts for thread damage, galling, etc.
 - 3) Check fireshield nuts for damage.
 - 4) Visually check absorber angles on separator plate for weld integrity, damage, etc.
 - 5) Visually check absorber tubes inside fireshield for damage.
- g. Align the cask on jacket base so that protective jacket will align with the cask lifting ears and mate with base bolt holes.
- h. Position protective jacket on jacket base and secure all jacket bolts to 900 ± 100 ft-lb. torque in a criss-cross pattern.
- i. Secure the anti-tiedown covers on protective jacket lifting eyes. Assure the printing on the anti-tiedown covers is legible.

- j. Attach a security seal (Item 6) through a protective jacket bolt. Verify the seal number is recorded on the shipping paperwork.
- k. Survey the assembled package for radiation levels and smearable contamination. Release the package per applicable DOT/NRC regulations.
- l. Attach appropriate shipping labels. Place required DOT labels on the protective jacket.
- m. ASSURE PACKAGE ASSEMBLY IS SECURED TO TRANSPORT VEHICLE USING THE APPROVED TIEDOWN EYES (ITEM 3). TWO ADDITIONAL CHAINS TO SECURE FIRESHIELD PALLET TO VEHICLE ARE RECOMMENDED. OTHER TIEDOWN ROPING, CABLING, OR CHAINING ARRANGEMENT, USING THE TIEDOWN EYES (ITEM 3) MAY BE USED, PROVIDING THE SHIPPER PERFORMS AN ENGINEERING ANALYSIS AND EVALUATION.
- n. Promptly return the shipping package to:

General Electric Company
Vallecitos Nuclear Center
6705 Vallecitos Road/Highway 84
P.O. Box 460
Pleasanton, California 94566

MODEL 1500 SHIELDED CONTAINER

FIGURE WITHHELD UNDER 10 CFR 2.390

ATTACHMENT I

VACUUM DRYING PROCEDURE
(Ref. SK-91-39)1. Equipment

- a. Vacuum pump
- b. Vacuum gage
- c. Cask drain plug adapter
- d. Vacuum lines
- e. Absolute filter
- f. Appropriate size wrenches
- *| g. Liquid nitrogen (LN)

2. Procedure

- a. Tighten lid bolts to 120 ± 10 ft-lbs torque in a criss-cross pattern.
- b. Install special drain plug adapter.
- c. Attach vacuum pump line to drain plug.
- d. Direct discharge line to a ventilation duct and away from personnel working areas.
- e. Verify all fittings are tight.
- f. Turn on vacuum pump.
- *| g. Fill cryogenic trap with liquid nitrogen (LN). Verify the trap is full by viewing the liquid level. Periodic addition of LN to the trap will be required.
- **| h. Evacuate cask cavity until 2.5 torr pressure or less is obtained for a period of 5 minutes or more. Cask cavity will be dry at this pressure. Pressure must continue dropping during this period. A rise of pressure may indicate trapped moisture in the cask cavity. The cask cavity is vacuum dried once a continuous drop in pressure is obtained.
- i. Shut off vacuum pump.
- j. Vent system to atmosphere.
- k. Remove and store all equipment.

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**|OCN 1562 (12/9/97)

ATTACHMENT I

CASK CAVITY DRYING PROCEDURE

NOTE: BEFORE STARTING THE DRYING PROCEDURE, VERIFY THAT: (A) THE CASK CAVITY HAS BEEN DRAINED OF WATER AND (B) ALL LID BOLTS HAVE BEEN INSTALLED AND TORQUED ACCORDING TO PROCEDURE.

1. Fill vacuum pump with oil supplied.
2. Attach male adapter fitting marked with red band to the drain port on the cask body.
CAUTION: DO NOT OVERTIGHTEN.
3. Attach color-coded tee, vacuum gauge, and valve as shown in the diagram.
4. Connect color-coded vacuum hoses between valve, cryogenic trap (cryogenic trap must be dry inside and lid snug), vacuum pump, and HEPA filter. See diagram.
5. Connect vacuum gauge cable to vacuum gauge and vacuum pump power cord to the control box.
6. Turn on power to control box.
7. Calibrate vacuum gauge to atmospheric pressure (760 torr) by turning the ATM screw located on the face of the vacuum display instrument (control box).
- *| 8. Close valve and fill cryogenic trap with liquid nitrogen. Verify the trap is filled by viewing the liquid level. Procedure will require periodic addition of liquid nitrogen to keep trap full.
9. Turn on vacuum pump and gradually open the valve. **CAUTION: CRYOGENIC TRAP MAY BOIL OVER.**
10. Verify that vacuum pressure is reduced by reading the vacuum display. Typically, the vacuum pressure will stabilize at approximately 15 torr while the moisture is being drawn from the cask cavity.
- **| 11. Continue the procedure until the vacuum pressure reads 2.5 torr or less for a period of 5 minutes or more. Pressure must continue dropping during this period. A rise of pressure may indicate trapped moisture in the cask cavity. The cask cavity is vacuum dried once a continuous drop in pressure is obtained.
12. Close valve.
13. Turn off pump.
- *| 14. Disconnect vacuum hose from the valve.
15. Empty liquid nitrogen from cryogenic trap, and dry cavity. **CAUTION: MOISTURE IN TRAP MAY BE CONTAMINATED.**
16. Drain vacuum oil from pump. **CAUTION: OIL MAY BE CONTAMINATED.**
17. Proceed to the leak testing procedure.

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