71-5939

NEUTRON PRODUCTS inc

22301 Mt. Ephraim Road, P. O. Box 68
Dickerson, Maryland 20842 USA
301-349-5001 FAX: 301-349-5044
e-mail: neutronprod@erols.com

October 10, 2002

Ms. Nancy Osgood
Senior Project Manager
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

Re: Certificate of Compliance No.5939 for the Model 1500 Package
Request for Wet-loading of Neutron's Model 1500 Type B shipping package, serial number 1506

Dear Ms. Osgood:

Neutron's 1500 Shipping Package Loading Procedure R-5504, and Neutron's 1500 Shipping Package Unloading Procedure, Procedure R-5505, have been revised. The sections referring to the required crane inspections have been revised to reference the OSHA General Industry standards, instead of the Construction standards. I am sending you copies of the revised procedures.

Please contact me promptly, if you require further information.

Sincerely,

NEUTRON PRODUCTS, INC.

Pamela Burda for
Marvin M. Turkanis

NMSS01

Enclosures:
1. Neutron's 1500 Shipping Package Loading Procedure R-5504, Revision 1, dated October 8, 2002
2. Neutron's 1500 Shipping Package Unloading Procedure, Procedure R-5505, Revision 1, dated October 8, 2002

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22301 Mt. Ephraim Road • P. O. Box 68 • Dickerson, Maryland 20842 USA
Telephone: 301-349-5001 • FAX: 301-349-5007 • e-mail: neutronprod@erols.com

NEUTRON'S 1500 SHIPPING PACKAGE LOADING PROCEDURE

Procedure R-5504

Revision 1

Effective Date: Oct. 8, 2002

Reviewed for Compliance, Safety, and Adequacy for Intended Purpose and Approved

Jeffrey D. Williams, RSO MD-31-025-01
Date Sept 25, 2002

Marvin M. Turkanis, ~~Division III Manager~~
Date 10/1/02

Jeffrey W. Corun, Manager LAA
Date 9-26-02

Pamela A. Burda, Division III QA Manager
10/8/02

J. Richard Demory, Pool Manager
Date 10-8-02

Dale L. Repp, Manager, Radioactive Shipping Packages
Date 09:27-2002

Author: Marvin M. Turkanis

Change record: This document supersedes Revision 0.

This is a controlled document and as such shall only be modified in accordance with the latest revision of Procedure C-9000, Preparation of Quality System Procedures and Procedure C-9001, Document and Data Control. This document is valid only after it has been reviewed

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1500 SHIPPING PACKAGE LOADING PROCEDURE

Procedure R-5504

Revision 1

1. Purpose

The purpose of this procedure is to describe the wet and dry loading of an empty Model 1500 Type B shipping package and the preparation of the package assembly for shipment. This procedure is based on General Electric's generic procedure and Neutron's experience with the 1500 shipping package, as provided in the Paragraph 2, Scope of General Electric's generic procedure.

2. Scope

This procedure applies to General Electric's Model 1500 Type B shipping package, serial number 1506.

3. Definitions and Abbreviations

CoC: Certificate of Compliance
DOT: Department of Transportation
LAA: Limited Access Area
NRC: Nuclear Regulatory Commission
OSHA: Occupational Safety and Health Administration
RSO: Radiation Safety Officer

4. References

Model 1500 Shipping Cask Certification Drawing # 129D4750, rev. 9

Model 1500 Protective Jacket Certification Drawing # 129D4749, rev. 5

Model 1500 Transport Container Certification Drawing # 129D4748, rev. 7

5. Responsibilities

5.1 The Pool Manager is responsible for planning the package loading, which shall include, at a minimum, confirmation that:

- the CoC and the applicable procedures have been reviewed and are available;
- qualified individuals are available;

- there are written instructions approved by the Division III Quality Assurance Manager specifying the sources that are to be loaded and the applicable loading pattern;
- all necessary maintenance has been or will be performed on the package before it is loaded;
- all the necessary tools are available for surveying, lifting, disassembling, loading, assembling; decontamination, drying if wet loaded, and leach testing; and,
- all the applicable radiation monitoring, lifting and torquing tools have current calibrations.

6. Safety

Adherence to all Neutron safety rules and guidelines is required for all personnel that load and unload sources, and perform maintenance on the 1500 shipping package. Personnel who perform inspections and maintenance on the 1500 shipping package shall utilize the appropriate personal protective equipment, which may be found on the specific RWP for that job. All internal procedures and precautions associated with handling radioactive materials shall be followed when sources are loaded and unloaded.

7. Operational Requirements and Restrictions

7.1 Confirm from the shipping documents or other records that the shipping package is empty.

7.2 The packaging shall be in accordance with the Model No. 1500 packaging as specified in Certificate of Competent Authority USA/5939/B( )F.

7.3 The contents to be loaded shall be cobalt-60 targets and sources meeting the requirements of Special Form radioactive material and incidental reactor products as contamination on or in the targets.

7.4 This procedure can be performed by any operator duly qualified by Neutron's RSO .

8. General Information

8.1 Variances to these guidelines are permissible provided they are in compliance with the applicable requirements on the shipping package Certificate of Compliance, the receiving facility licenses, and DOT/NRC regulations.

8.2 Internal facility operating procedures shall be followed for the "routine" transfers,

movements, decontamination, radiation controls, etc. of the shipping package. These procedures may be consulted for the equipment required for each operation.

8.3 All cranes shall be inspected as prescribed in 29 CFR 1910.179(j) to verify that they meet OSHA requirements. Any that do not meet OSHA requirements shall be removed from service until they can be repaired to meet the requirements. Anyone using a crane shall verify that it has been inspected within the last year as required by 29 CFR 1910.179(j)(ii)(b) and has met OSHA requirements, and has been inspected prior to use as required by 29 CFR 1910.179(j)(ii)(a) and has met OSHA requirements. Cranes not in regular use shall be inspected according to 1910.179(j)(4).

8.4 Refer to the drawings listed in Section 4 for the location of components of the shipping package, such as lifting ears and drain and vent plugs.

9. Package Loading

9.1 Special Requirements

9.1.1 A copy of this procedure shall accompany or precede the first shipping package sent to a user in whose facility radioactive material will be loaded into this shipping package.

9.1.2 The following drawings are required for the package loading:

Model 1500 Shipping Cask Certification Drawing
Model 1500 Protective Jacket Certification Drawing
Model 1500 Transport Container Certification Drawing

9.1.3 The silicone rubber lid gaskets shall be tested annually and replaced within the12-month period preceding each shipment.

9.1.4 Prior to each shipment, the silicone rubber lid gaskets shall be inspected and replaced if the inspection shows any defects.

9.1.5 Cavity vent and drain lines shall be sealed with Teflon tape or the equivalent applied to threads of the pipe plugs prior to shipment.

9.1.6 The package shall have been bubble-tested within the 12-month period preceding each shipment, and after each third use.

9.1.7 The protective jacket and the exterior of the shipping cask shall meet the DOT limits for radioactive contamination prior to shipment. The protective jacket and the cask exterior shall be less than 2,200 dpm per 100 cm^2 removable beta/gamma for a smear of 300 cm^2, in order to comply with current DOT regulations given in 49 CFR 173.443.

9.1.8 No modification, replacement, repair, or rework to the shipping package

(protective jacket and cask) shall be made without written permission from Neutron Products, Inc , Dickerson, Maryland.

9.1.9 All package components (except product and nonreturnable product holder) shall be returned to Neutron unless otherwise authorized by Neutron.

9.1.10 The cask cavity shall be leak checked per the requirements of the Certificate of Compliance and Appendix III, *Bubble Test.* If the cask does not pass the bubble test, it shall be taken out of service until the leak is repaired per an approved procedure.

9.1.11 Do not attempt to lift the cask by the eye on the cask lid. The eye is for lifting the cask lid only. The cask lid weight is 500 ± 150 pounds.

9.1.12 Only the tie-down eyes on the side of the protective jacket are approved to secure the package assembly to the transport vehicle. Two additional chains to secure the protective jacket pallet to the vehicle are recommended. Other tie-down roping, cabling, or chaining arrangement using the tie-down eyes may be used providing the shipper performs an engineering analysis and evaluation.

9.1.13 Do not lift the protective jacket and cask package assembly by the top rectangular holes on the protective jacket. These are only for moving the protective jacket after it has been unbolted from the base (pallet).

9.1.14 The lugs 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.

9.1.15 The lifting eyes (rectangular holes) on the protective jacket shall be secured with the anti-tie-down covers to prevent use as tie-down system during transport. The protective jacket lifting eyes are not approved to secure the package assembly to the transport vehicle.

9.2 Protective Jacket Disassembly

9.2.1 Monitor the exterior container surface for radioactive contamination and dose rate with appropriate radiation detection instruments, such as the Ludlum Model 14C or equivalent. Notify both Neutron's RSO and the RSO of the site where the package is being disassembled if the container surface is contaminated in excess of that permitted in the DOT regulations given in 49 CFR 173.443 (less than 2,200 dpm per 100 cm^2 removable beta/gamma for a smear of 300 cm^2), if the dose rate is higher than indicated on the shipping papers, or the dose rate indicates that the package may not be empty.

9.2.2 Verify the security seal number with shipping documents. Remove the

security seal.

9.2.3 Unscrew and remove the bolts from the base of the protective jacket. Use care not to damage or lose the bolts. All the bolts will be required for reassembly.

9.2.4 Bring appropriate capacity handling equipment to the approved disassembly area. The shipping package gross weight is 15,500 ± 500 pounds. All lifting equipment and components must be rated to lift this weight.

9.2.5 Carefully lift the protective jacket off the cask, either by using the rectangular holes on top of the jacket or by using the lug tie-down ears and appropriately rated slings. The protective jacket must be lifted straight up to prevent damage to the cask.

9.2.6 Place the protective jacket in a non-contaminated area or cover it to protect from becoming contaminated.

9.2.7 Monitor the cask dose rate with a Ludlum Model 14C radiation detection instrument or equivalent.

9.2.8 Smear the cask surface to check for radioactive contamination, using the applicable internal procedure. If contamination is detected above the DOT authorized limit (less than 2,200 dpm per 100 cm^2 removable beta/gamma for a smear of 300 cm^2), notify both Neutron's RSO and the RSO of the site at which the package is being disassembled, and follow applicable internal procedures for contamination control and decontamination activities.

9.2.9 Lift the cask off the protective jacket base using the ears on each side of the cask. The cask weighs approximately 12,300 pounds. Use lifting equipment and components rated to lift this weight. Do not lift the cask using the eye in the cask lid. The cask lid eye is authorized for lifting the lid only.

9.3 Loading Casks - Dry Remote Operations

9.3.1 Use appropriate material handling equipment to move and position the cask on a stable foundation in a hot cell or equivalent shielded remote handling facility. For dry loading, a crane, forklift, or dolly rated to support the approximately 12,300-lb cask is required for moving the cask to and from the hot cell, as well as a crane rated to lift the approximately 500-lb lid.

9.3.2 Follow appropriate internal procedures for dose rate monitoring and respiratory protection requirements.

9.3.3 If required by the Certificate of Compliance and the number of shipments since the last cavity leak check, bubble test the cavity per Appendix III, *Bubble Test.*

9.3.4 To load items into the cask:

9.3.4.1 Before removal of the cask lid, if the pool in which the loading will take place is uncontaminated, ensure that all remote handling tools to be used are as free of contamination as the item(s) being loaded.

9.3.4.2 Remove the cask lid bolts. Place the bolts in a convenient location so they will not be lost, damaged, or contaminated. All the bolts will be required for assembly.

9.3.4.3 Use an appropriately rated lifting device to remotely remove the cask lid. The cask lid weight is approximately 500 lbs.

9.3.4.4 Smear the cask cavity for radioactive contamination. Clean to the required levels per appropriate internal procedures.

9.3.4.5 Check the cask vent and drain lines. Remove previous thread sealants and apply Teflon tape or equivalent thread sealant to the vent or drain plug threads. Replace the vent or drain plug and tighten.

9.3.4.6 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. If the sealing surface has a defect that could adversely affect sealing of the shipping package, notify Neutron's RSO.

9.3.4.7 Visually inspect the cask lid bolts for obvious damage. If any component of the shipping package requires repair or replacement, notify Neutron's RSO.

9.3.4.8 Properly position the gasket.

9.3.4.9 Remotely transfer the materials into the cask cavity, using the source holder specified in the written instructions for loading, if applicable (see Section 5.1). A lifting eye or bail shall be on the container or material.

9.3.4.10 Replace the cask lid and bolts. Tighten the lid bolts to 120 ± 10ft - lbs. torque in a criss-cross pattern.

9.3.4.11 A crane, forklift or dolly rated to support the approximately

16,000 pound packaging is required for moving the package between the area where it is loaded and a storage area or a transport vehicle.

9.4 Loading Casks - Wet Operation (for dry loading, see Section 9.3)

9.4.1 Use appropriate material handling equipment and position the cask on a stable foundation. A crane rated to lift the approximately 12,800-lb cask plus lid is required for placing the cask in and removing it from the pool, as well as a crane rated to lift the approximately 500-lb lid. Follow appropriate internal procedures for dose rate monitoring.

9.4.2 Perform the cavity leak check, if required, prior to loading cask. Leak tests shall be as designated in the Certificate of Compliance and Appendix III, *Bubble Test.*

9.4.3 Use shackle bolts mounted through holes in cask lifting ears for crane hook attachment points. Use an overhead crane for raising and lowering the cask.

9.4.4 The weight of the cask plus the lid is approximately 12,800 lb. The material handling equipment must be rated to lift this weight.

9.4.5. Prepare the cask for lowering into the pool. Remove the lid bolts and vent plug. Caution: do not move the cask any more than necessary with lid bolts removed.

9.4.6 Place the bolts, vent plug, and drain plug in a convenient location so they will not be lost, contaminated, or damaged. All bolts, vent plug, and drain plug will be required for reassembly.

9.4.7. Remove the lid. As the lid is being removed, survey with a Ludlum 14C meter or equivalent to verify that the cask is in fact empty. If the survey reveals that a source is present, replace the lid, notify Neutron's RSO, and proceed according to his instructions.

9.4.8 Visually check the gasket and cask lid sealing surfaces for cuts, nicks, tears, ragged edges or other defects that could adversely affect the sealing ability of the gasket. Replace the gasket if any defects are indicated. If the sealing surface has a defect that could adversely affect sealing of the shipping package, notify Neutron's RSO.

9.4.9 Visually inspect the cask lid bolts for obvious damage. If any component of the shipping package requires repair or replacement, notify Neutron's RSO.

9.4.10 If the water in the pool is contaminated, hook a fitting into the bottom of the cask through the drain plug and flow deionized water through the cask

and into the pool. This need not be done if the water in the pool is free from contamination.

9.4.11 Slowly lower the cask into the water to sufficient depth, so the water is at least 12 feet above the top of the cask, to insure safe radiation operation conditions for cask loading personnel.

9.4.12 Before loading the cask, if the water in the pool is uncontaminated, ensure that all remote pool tools are as free of contamination as the item(s) being loaded.

9.4.13 Transfer the material into the cask, using the source holder specified in the written instruction in Sec 5.1. A lifting eye or bail shall be on the container or material. Use care to not dislodge the cavity gasket.

9.4.14 Remotely check the position of the cask gasket and carefully replace the cask lid.

9.4.15 Slowly remove the cask from the water, monitoring the radiation levels.

9.4.16 Since the vent and drain plugs have been removed, water will drain from the cask cavity by gravity with the cask lid in place.

9.4.17 If deionized water has been flowing through the cask, take a sample of water to verify that no more than 0.005 μCi of contamination is present. Perform the test in accordance with Appendix II, *Leach Testing Procedure*. If the sample shows contamination above this limit, notify Neutron's RSO and proceed according to his instructions.

9.4.19 If deionized water has been flowing through the cask, turn off the flow of deionized water and remove the fitting from the drain plug.

9.4.20 Rinse the outside of the cask with deionized water.

9.4.21 Replace the cask lid bolts.

9.4.22 Tighten the lid bolts to 120 ± 10ft - lbs. torque in a criss-cross pattern.

9.4.23 Assure the cask cavity is empty of water using the technique described in Appendix I, *Drying Procedure*.

9.4.24 Dry the cask exterior.

9.4.25 Move the cask to a stable foundation.

9.4.26 Check the cask vent and drain lines. Remove previous thread sealants and apply Teflon tape or other thread sealant to the vent and drain plug threads. Replace the vent and drain plugs and tighten.

9.5 Leach Test

Verify the condition of the contents by performing the Leach Test per Appendix II, if specified in the written instructions for loading (see Section 5.1).

9.6 Reassembly and Return Shipment

9.6.1 Decontaminate the cask exterior and survey for radioactive contamination. The cask exterior shall be less than 2,200 dpm per 100 cm^2 removable beta/gamma for a smear of 300 cm^2, in order to comply with current DOT regulations given in 49 CFR 173.443.

9.6.2 Labeling the cask is an optional step. The heat generated by the sources may make it impossible. However, if labeling is done, remove any old labels from the cask exterior and apply the appropriate label, in accordance with the requirements of 49 CFR 172.403.

9.6.3 Visually inspect the cask ears for bending, cracked welds, or other defects. Notify Neutron's RSO if any abnormal condition is detected.

9.6.4 Return the full cask to the storage area.

9.6.5 Remove any old labels from the protective jacket exterior.

9.6.6 Visually inspect the protective jacket for damage. Notify Neutron's RSO if any damage requiring repair is detected.

9.6.7 Check the protective skirt for damage.

9.6.8 Check the protective jacket bolts for thread damage, galling, etc.

9.6.9 Check the protective jacket nuts for damage.

9.6.10 Visually check the absorber angles on the separator plate for weld integrity, damage, etc.

9.6.11 Visually check the absorber tubes inside the protective jacket for damage.

9.6.12 Align the cask on the jacket base so that the protective jacket will align with the cask lifting ears and mate with base bolt holes.

9.6.13 Position the protective jacket on the jacket base and secure all jacket bolts to 900 ± 100 ft-lbs torque in a criss-cross pattern.

9.6.14 Secure the anti-tie-down covers on protective jacket lifting eyes. Assure the printing on the anti-tie-down covers is legible.

9.6.15 Attach a security seal through a protective jacket bolt. Verify the seal number is recorded on the shipping paperwork.

9.6.16 Survey the assembly package for radiation levels and removable contamination. Decontaminate as necessary. The DOT limits for radiation levels are given in 49 CFR 173.441, and the limits for removable contamination are given in 49 CFR 173.443.

9.6.17 Place required DOT labels on the protective jacket. Follow the requirements given in 49 CFR 172.403.

9.6.18 Assure the package assembly is secured to the transport vehicle using the approved tie-down eyes. Two additional chains to secure the protective jacket pallet to the vehicle are recommended. Other tie-down roping, cabling, or chaining arrangement, using the tie-down eyes may be used, providing the shipper performs an engineering analysis and evaluation.

9.6.19 Promptly return the shipping package in accordance with Neutron's written instructions.

10. Records

10.1 A copy of all applicable documents shall be stored in the Document File Room.

10.2 All shipping and maintenance documents shall be stored for at least three (3) years.

10.3 All documentation involving fabrication, repair, and replacement shall be stored for not less than three years after the last use of the package by Neutron.

11. Change Record

The references in Section 8.3 have been changed from the OSHA Construction Standards to the General Industry standards.

12. Appendices

Appendix I, Drying Procedure

Appendix II, Leach Testing Procedure

Appendix III, Bubble Test

Appendix IV, Pre-Shipment Inspection and Annual Maintenance Summary

13. Attachments

Attachment I, Model 1500 Shipping Package Annual Inspection Record

APPENDIX I
DRYING PROCEDURE

1. **EQUIPMENT**

Bottle of inert gas, such as helium or argon, for drying and backfilling

Appropriate hoses and connections

2. **PROCEDURE**

2.1 Attach the bottle of inert gas with a flexible hose to the vent plug.

2.2 Allow the package to heat from the contained cobalt-60 for at least 2 hours.

2.3 Flush the package at approximately 10 ft^3/hr for at least 1 additional hour.

2.4 Continue flushing the package until a clean mirror placed in the exit gas stream shows no condensation.

2.5 Backfill the container with the inert gas.

APPENDIX II
LEACH TESTING PROCEDURE

1. **EQUIPMENT**

Two gasoline filters and manifold.

2. **PROCEDURE**

2.1 Remove the drain plug and verify that the drain line is not obstructed, i.e., by Teflon tape.

2.2 Remove the vent plug from the lid and verify that the vent is not obstructed, i.e., by Teflon tape.

2.3 Attach first filter assembly to the vent.

2.4 Attach the manifold to the drain plug.

2.5 Attach the second filter assembly to the drain plug.

2.6 Attach the hose from the manifold to the Fill container.

2.7 Elevate the Fill container above the top of the package.

2.8 Close all valves on the manifold.

2.9 Fill the FILL container with water approximately equal in volume to the remaining void in the package. (The remaining void is a function of the volume of the sources and the source carriers. The total void volume is 0.6 ft^3.)

2.10 Open the valve connecting the Fill container to the package and allow the package to fill.

2.11 Close the valve connecting the Fill container to the package when the filling is complete.

2.12 Let water stand for at least 10 minutes.

2.13 Open the drain valve and drain the water through a filter. **(CAUTION: Water will be thermally hot.)**

2.14 Allow filters to cool.

2.15 Remove the filters from the filter cartridge and count the activity of them together.

2.16 If the activity exceeds 0.005 uCi, return to step 7.

2.17 Notify Neutron's'S RSO if the activity remains above 0.005 uCi after five flushes.

APPENDIX III
Bubble Test

1. EQUIPMENT

Sheet of Plexiglas that matches the bolt circle of the cask and contains a pipe fitting to connect the cask cavity to a vacuum pump and vacuum gauge

Vacuum pump capable of drawing and holding a pressure of 2.5 psia in the cask cavity

Vacuum gauge to indicate pressure in the cask cavity

Piping connections from the cask cavity to the vacuum gauge and vacuum pump

Flashlight to observe the bottom of the cask cavity for generation of bubbles

2. PROCEDURE

2.1 Set the cask on a horizontal surface.

2.2 Ensure that the plug in the drain line is properly installed and that the cask cavity is empty and has no standing water.

2.3 Pour a small quantity of deionized or distilled water into the cask cavity. Fill the drain line and cover the bottom of the cask cavity with about 1/4 inch of water. Add the water without splashing to avoid aerating the water.

2.4 Ensure that the head gasket is in place and in good condition. Put the Plexiglas sheet over the top of the cask cavity and ensure that it is in proper alignment with the bolt holes in the cask.

2.5 Connect the vacuum gauge, vacuum pump, and pump shutoff valve to the pipe fitting in the Plexiglas sheet. The cask lid bolts may be used or not used during this test.

2.6 Turn on the vacuum pump and run it until the pressure in the cask cavity is no greater than 2.5 psia. (This corresponds to a vacuum of 25 inches of Hg.) When this pressure is reached, turn off the vacuum pump, close the pump shutoff valve, and determine whether the pressure can be held. If so, leave the pump off and the shutoff valve closed. If not, open the shutoff valve and run the pump enough to maintain the specified vacuum.

2.7 Maintain the vacuum in the cask cavity for 15 minutes and observe for continuous bubble generation.

2.8 If there is a continuous generation of bubbles, remove the shipping cask from service and notify Neutron's RSO.

Note: If the residual heat in the cask prevents visualization of the bubbles, either use an anti-fog agent on the clear top or wait until the cask cools sufficiently to allow the bubbles to be seen.

APPENDIX IV

PRE-SHIPMENT INSPECTION AND ANNUAL MAINTENANCE SUMMARY

1. Energy-Absorbing Angles, Energy-Absorbing Tubes, and Separator Plate

1.1 The absorber angles and tubes shall all be in place and serviceable.

1.2 Inspection of the visible angles on top of the Separator Plate prior to each shipment shall be used to infer the condition of the angles below the plate. If the top angles are found to be damaged, the plate shall be removed to inspect the lower angles. If the top angles are acceptable, inspection of the lower set of angles is not required.

1.3 Angles, tubes, and plate shall be visually inspected for wear, crushing, or deformation prior to package assembly.

1.4 All angles, tubes, and plate shall be inspected at least once per year or at assembly for shipment, whichever comes later.

2. Cask Lifting Ears

2.1 Prior to each usage, the lifting ears will receive a visual inspection to assure no significant physical/mechanical damage has been sustained from previous handling, such as cracked welds.

3. Vent and Drain Plugs

3.1 Vent and drain plugs shall be visually inspected for damage whenever they are installed.

3.2 Plugs showing no obvious wear, corrosion or damage on the thread diameter are acceptable for reuse.

4. Cask Seal Gaskets

4.1 Each cask seal gasket shall be examined visually for defects prior to each shipment.

4.2 A new cask seal gasket will be installed every 12 months.

4.3 The gasket shall be leak-tested after it is installed, using applicable internal procedures, and shall provide a cask lid to body seal of greater than 0.001 atm-cc/sec.

5. High-Strength Ear Bolts and Lid Bolts

5.1 Bolts shall be visually inspected for proper identification and obvious damage during each assembly.

5.2 Bolts with evidence of obvious wear or damage to the bolt shank or the threads, corrosion, or improper identification shall be replaced.

6. Jacket Base Nut and Jacket Hex Bolts

6.1 In-service inspection shall be performed during each assembly and consist of insertion of an appropriate jacket bolt, by hand, into the base nut. Bolts or nuts with minor damage shall have their threads chase with an appropriate tap. Any lubricants are acceptable.

6.2 Nuts and bolts shall be visually inspected at least once per year or at assembly for shipment, whichever comes later.

7. Nameplate

7.1 The nameplate shall be inspected before each shipment to verify that all information is legible.

7.2 The nameplate shall be inspected before each shipment to verify that all information conforms to current DOT regulations.

8. Cask Lid

8.1 The cask lid shall be visually inspected before each shipment to verify that it is undamaged.

8.2 The cask lid sealing surface shall be visually inspected before each shipment for cuts, nicks, tears, ragged edges or other defects that could adversely affect the sealing ability of the gasket.

8.3 If the cask lid sealing surface has a defect that could adversely affect sealing of the shipping package, notify Neutron's RSO.

ATTACHMENT I

Model 1500 Shipping Package Annual Inspection Record

MODEL 1500 SHIPPING PACKAGE
ANNUAL INSPECTION RECORD

Inspection Data:

Package Serial Number: 1506 Date(s) of Inspection: _____

Inspected by: _____

References:

1. Certificate of Compliance No. 5939. Condition 8(b), Model 1500 Package.
2. Neutron Application for Certificate Renewal dated September 23, 2002, R-5504, 1500 Shipping Package Loading Procedure
3. Neutron Application for Certificate Renewal dated September 23, 2002, R-5505, 1500 Shipping Package Unloading Procedure
4. NPI Quality Assurance Program for Transportation of Radioactive Materials, Revision 8

General Instructions/Inspection Results:

1. The shipping package shall be disassembled and reassembled in accordance with Reference 2.

2. Radiation surveys and wipe tests shall be conducted according to the applicable Neutron procedures prior to the annual inspection.

3. Caution shall be exercised when handling cask and protective jacket components. All lifting devices shall be rated for the weights. Approximate weights are as follows:

   a) Total package weight - 16,000 pounds
   b) Cask weight - 12,300 pounds
   c) Lid weight - 500 pounds
   d) Protective jacket weight - 2,500 pounds
   e) Pallet weight - 700 pounds

   See Attachment IV for a summary of required inspections and maintenance.

4. <u>Cask Seal Gasket</u>

   Accept _____ Reject _____ Replace _____

   Comments: _____
   (Include date gasket was replaced)

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Uncontrolled Document Which May Become Out-of-Date

5. Cask Drain Plug

Accept _____ Reject _____ Replace _____

Comments: _____

6. Cask Lid Bolts

Accept _____ Reject _____ Replace _____

Comments: _____

7. Nameplate

Accept _____ Reject _____ Repair/Replace _____

Comments: _____

8. Cask Lid Inspection

Accept _____ Reject _____ Repair _____

Comments: _____

9. Absorber Angles

Accept _____ Reject _____ Repair/Replace _____

Comments: _____

10. Separator Plate

Note: The separator plate is the circular plate with angles welded to it upon which the cask sits when on its pallet.

Accept _____ Reject _____ Repair _____

Comments: _____

CONTROLLED FORM

Uncontrolled Document Which May Become Out-of-Date

11. Absorber Tubes

Note: The absorber tubes are welded to the inside surface of the protective jacket inner shell.

Accept _____ Reject _____ Repair _____

Comments: _____

12. Cask Lifting Ears

Accept _____ Reject _____ Repair _____

Comments: _____

13. Vent Plug

Accept _____ Reject _____ Repair _____

Comments: _____

14. Ear Bolts

Accept _____ Reject _____ Repair _____

Comments: _____

15. Metal Jacket Base Nuts

Note: Base nuts are welded to the underside of the pallet.

Accept _____ Reject _____ Repair _____

Comments: _____

16. Jacket Hex Bolts

Accept _____ Reject _____ Repair _____

Comments: _____

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17. Cask/Protective Jacket Maintenance and Inspection

Note: This item includes the inspection of all cask and protective jacket welds. Leak testing of the cask cavity is covered by item 18 below.

Accept _____ Reject _____ Repair _____

Comments: _____

18. Leak Testing of Cask Cavity

Note: The leak test requires pressurizing the cask cavity via the vent line with air or an inert gas to 2.5 psia, holding the pressure for 15 minutes, and applying soap solution to the gasket, lid bolts, and drain plug. If there is no indication of bubbling, the cask cavity has successfully passed the leak test. See Appendix III, *Bubble Test*, for more details on the test.

Accept _____ Reject _____ Repair _____

Comments: _____

CERTIFICATION

NPI Model 1500 Cask, Serial Number 1506, has been inspected and tested in accordance with Neutron Procedure R-5504 and has been determined to be suitable for continued service.

Authorized NPI Representative: _____

Title: _____

Date: _____

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NEUTRON'S 1500 SHIPPING PACKAGE UNLOADING PROCEDURE

Procedure R-5505

Revision 1

Effective Date: Oct. 8, 2002

Reviewed for Compliance, Safety, and Adequacy for Intended Purpose and Approved

Jeffrey D. Williams, RSO MD-31-025-01
Date Sept 25, 2002

Marvin M. Turkanis, ~~Division III Manager~~
Date 10/1/02

Jeffrey W. Corun, Manager LAA
Date 9-26-02

J. Richard Demory, Pool Manager
Date 10-8-02

Dale L. Repp, Manager, Radioactive Shipping Packages
Date 09. 27. 2002

Pamela A. Burda, Division III QA Manager
10/8/02

Author: Marvin M. Turkanis

Change record: This document supersedes Revision 0.

This is a controlled document and as such shall only be modified in accordance with the latest revision of Procedure C-9000, Preparation of Quality System Procedures and Procedure C-9001, Document and Data Control. This document is valid only after it has been reviewed

Not valid for use without a control copy number.

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1500 SHIPPING PACKAGE UNLOADING PROCEDURE

Procedure R-5505

Revision 1

1. Purpose

The purpose of this procedure is to describe the unloading of the Model 1500 Type B shipping package, serial number 1506, and the preparation of the package assembly for shipment, which is based on General Electric's generic procedure and Neutron's experience with the 1500 shipping package, as provided in the Paragraph 2, Scope of General Electric's generic procedure.

2. Scope

This procedure applies to General Electric's Model 1500 Type B shipping package, serial number 1506.

3. Definitions and Abbreviations

CoC: Certificate of Compliance
DOT: Department of Transportation
LAA: Limited Access Area
NRC: Nuclear Regulatory Commission
OSHA: Occupational Safety and Health Administration
RSO: Radiation Safety Officer

4. References

Model 1500 Shipping Cask Certification Drawing # 129D4750, rev. 9

Model 1500 Protective Jacket Certification Drawing # 129D4749, rev. 5

Model 1500 Transport Container Certification Drawing # 129D4748, rev. 7

5. Responsibilities

5.1 The Pool Manager is responsible for planning the package unloading, which shall include, at a minimum, confirmation that:

- the CoC and the applicable procedures have been reviewed and are available;
- qualified individuals are available;

- there is a written description approved by the Division III Quality Assurance Manager of the sources that are to be unloaded;
- all the necessary tools are available for surveying, lifting, disassembling, unloading, assembling; decontamination and leach testing, if required; and,
- all the applicable radiation monitoring, lifting and torquing tools have current calibrations.

6. Safety

Adherence to all safety rules and guidelines is required for all personnel that load and unload sources, and perform maintenance on the 1500 shipping package. Personnel who perform inspections and maintenance on the 1500 shipping package shall utilize the appropriate personal protective equipment, which may be found on the specific RWP for that job. All internal procedures and precautions associated with handling radioactive materials shall be followed when sources are loaded and unloaded.

7. Operational Requirements and Restrictions

7.1 Confirm the contents of the package from the shipping documents.

7.2 The packaging shall be in accordance with the Model No. 1500 packaging as specified in Certificate of Competent Authority USA/5939/B( )F.

7.3 This procedure can be performed by any operator duly qualified by Neutron's RSO.

7.4 Neutron's RSO shall specify in writing if a leach test is to be performed.

8. General Information

8.1 Variances to these guidelines are permissible provided they are in compliance with the applicable requirements on the shipping package Certificate of Compliance, the receiving facility licenses, and DOT/NRC regulations.

8.2 Internal facility operating procedures shall be followed for the "routine" transfers, movements, decontamination, radiation controls, etc. of the shipping package, and may be consulted to determine the equipment required.

8.3 Refer to the drawings listed in Section 4 for the location of components of the shipping package, such as lifting ears and drain and vent plugs.

8.4 For wet unloading, lifting equipment rated to lift the approximately 16,000-pound

packaging is required for placing the packaging in and removing it from the pool. Lifting equipment rated to lift the approximately 500-pound lid is also required.

8.5 For dry unloading, a crane, forklift, or dolly rated to support the approximately 16,000-pound packaging is required for moving the package between the area where it will be unloaded and a storage area or a transport vehicle.

8.6 Lifting equipment rated to lift the approximately 16,000-pound packaging is required for unloading the package from the transport vehicle.

8.7 All cranes shall be inspected as prescribed in 29 CFR 1910.179(j) to verify that they meet OSHA requirements. Any that do not meet OSHA requirements shall be removed from service until they can be repaired to meet the requirements. Anyone using a crane shall verify that it has been inspected within the last year as required by 29 CFR 1910.179(j)(ii)(b) and has met OSHA requirements, and has been inspected prior to use as required by 29 CFR 1910.179(j)(ii)(a) and has met OSHA requirements. Cranes not in regular use shall be inspected according to 1910.179(j)(4).

9. Package Unloading

9.1 Special Requirements

9.1.1 A copy of this procedure shall accompany or precede the first shipping package sent to a user in whose facility radioactive material will be unloaded from this shipping package.

9.1.2 This procedure does not authorize or include any modification, replacement, repair, or rework to the shipping package (protective jacket and cask), which shall only be made with written permission from Neutron Products, Inc., Dickerson, Maryland.

9.1.3 All package components (except product and nonreturnable product holder) shall be returned to Neutron unless otherwise authorized by Neutron.

9.1.4 Do not attempt to lift the cask by the eye on the cask lid. The eye is for lifting the cask lid only. The cask lid weight is approximately 500 pounds.

9.1.5 Do not lift the protective jacket and cask package assembly by the top rectangular holes on the protective jacket. These are only for moving the protective jacket after it has been unbolted from the base (pallet).

9.1.6 The lugs 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.

9.1.7 The full cask may be thermally hot; avoid personnel contact or contact with anything which might melt at 200°F, such as plastic sheeting.

9.2 Protective Jacket Disassembly

9.2.1 Bring appropriate capacity material handling equipment to the approved disassembly area as required in Section 8. The package gross weight is approximately 16,000 pounds.

9.2.2 Monitor the exterior protective jacket surface for radioactive contamination and dose rate with appropriate radiation detection instruments. Notify both Neutron's RSO and the RSO of the site at which the package is being disassembled if the container surface is contaminated in excess of that permitted in the DOT regulations given in 49 CFR 173.443 (less than 2,200 dpm per 100 cm^2, removable beta/gamma for a smear of 300 cm^2), or if the dose rate is higher than that indicated on the shipping papers.

9.2.3 Compare the security seal number with that on the documents. Remove the security seal if the seal numbers are the same. Notify Neutron's RSO and the RSO of the site at which the package is being disassembled if the seal numbers are different.

9.2.4 Unscrew and remove the base of the protective jacket. Use appropriately-rated lifting equipment. The base weighs approximately 700 pounds. Use care not to damage or lose the bolts. All the bolts will be required for reassembly.

9.2.5 Carefully lift the protective jacket off the cask, either by using the rectangular holes on top of the jacket or by using the lug tie-down ears and appropriately rated slings. The protective jacket must be lifted straight up to prevent damage to the cask. Use appropriately-rated lifting equipment. The protective jacket weighs approximately 2500 pounds.

9.2.6 Place the protective jacket in a non-contaminated area or cover it to prevent it from becoming contaminated.

9.2.7 Monitor the cask dose rate with a Ludlum Model 14C radiation detection instrument, or the equivalent.

9.2.8 Smear the cask surface to check for radioactive contamination. If contamination is detected above the DOT authorized limit given in 49 CFR 173.443 (less than 2,200 dpm per 100 cm^2 removable beta/gamma for a smear of 300 cm^2), notify both Neutron's RSO and the RSO of the site at which the package is being disassembled, and follow appropriate internal procedures for contamination control and decontamination activities.

9.2.9 Lift the cask off the protective jacket base, using the ears on each side of the cask. Do not lift the cask by using the eye in the cask lid. The cask lid eye is authorized for lifting the cask lid only. Transport the cask to the shielded work area. The weight of the cask plus the lid is approximately 12,800 pounds. Do not overload the material transport equipment, which must be rated to lift this weight.

9.2.10 Monitor the cask dose rate with a Ludlum Model 14C radiation detection instrument.

9.3 Leach Test

Prior to unloading the cask, verify the condition of the contents by performing the Leach Test per Attachment I, if specified in the written instructions for unloading (see Section 5.1).

9.4 Unloading Casks - Dry Remote Operations

9.4.1 Use appropriately-rated material handling equipment, following the guidelines given in Section 8, and position the cask on a stable foundation in a hot cell or equivalent shielded remote handling facility. The cask plus its lid weigh approximately 12,800 pounds.

9.4.2 Follow applicable internal procedures for dose rate monitoring and respiratory protection requirements.

9.4.3 Before removal of the cask lid, if the pool is uncontaminated, ensure that all remote handling tools to be used are as free of contamination as the item(s) being unloaded.

9.4.4 Remove the cask lid bolts. Place the bolts in a convenient location so they are not lost, damaged, or contaminated. All the bolts will be required for reassembly.

9.4.5 Use an appropriately-rated lifting device, following the guidance given in Section 8, to remotely remove the cask lid. The cask lid weight is approximately 500 pounds.

9.4.6 Remotely transfer the materials from the cask cavity. A lifting eye or bail shall be on the container or material.

9.5 Unloading Casks - Wet Operation

9.5.1 Use appropriately-rated material handling equipment, following the

guidance given in Section 8, and position the cask on a stable foundation. Follow appropriate internal procedures for dose rate monitoring.

9.5.2 Use shackle bolts mounted through holes in cask lifting ears for crane hook attachment points. Use an overhead crane for raising and lowering the cask. The cask weight is on the cask nameplate - do not exceed the capacity of the material handling equipment.

9.5.3 Attach the crane hook or appropriate length sling to the eye in the cask lid for underwater lid removal. The cask lid weight is approximately 500 pounds. Use appropriately-rated material handling equipment, following the guidance given in Section 8.

9.5.4 Prepare the cask for lowering into the pool. Remove the lid bolts and top vent plug. Caution: Do not move the cask any more than necessary with the lid bolts removed.

9.5.5 Place the bolts, vent plug, and drain plug in a convenient location so they are not lost, contaminated, or damaged. The vent plug, the drain plug, and all the bolts will be required for reassembly.

9.5.6 Slowly lower the cask into the water to a depth of at least 12 feet above the top of the cask to ensure safe radiation operation conditions for cask unloading personnel.

9.5.7 Before removal of the cask lid, if the pool is uncontaminated, ensure that all remote handling tools to be used are as free of contamination as the item(s) being unloaded.

9.5.8 Slowly raise the cask lid. Monitor dose rate to working personnel, using a Ludlum 14C meter or equivalent.

9.5.9 Rinse the lid with deionized water and set aside.

9.5.10 Remove the inner container with sources from the cask, using the lifting eye or bail on the container. Move the container to the storage or work area.

9.5.11 Slowly remove the cask from the water. Drain all water from the cask cavity over the pool, or transfer the cask to the decontamination area, to drain the cavity. Rinse the cask with deionized water.

9.5.12 Check to see that the water has drained from the cask cavity.

9.5.13 Check the cask vent and drain lines. Remove the previous thread sealant and apply Teflon tape or other thread sealant to the vent and drain plugs. Replace the vent and drain plugs and tighten.

9.5.14 Replace the cask lid.

9.7.15 Promptly return the shipping package in accordance with Neutron's written instructions.

10. Records

10.1 A copy of all applicable documents shall be stored in the Document File Room.

10.2 All shipping and maintenance documents shall be stored for at least three (3) years.

10.3 All documentation involving fabrication, repair, and replacement shall be stored for not less than three years after the last use of the package by Neutron.

11. Change Record

The references in Section 8.7 have been changed from the OSHA Construction Standards to the General Industry standards.

12. Appendices

Appendix I, Leach Testing Procedure

APPENDIX I
LEACH TESTING PROCEDURE

1. EQUIPMENT

Two gasoline filters and manifold.

2. PROCEDURE

2.1 Remove the drain plug and verify that the drain line is not obstructed, i.e., by Teflon tape.

2.2 Remove the vent plug from the lid and verify that the vent is not obstructed, i.e., by Teflon tape.

2.3 Attach first filter assembly to the vent.

2.4 Attach the manifold to the drain.

2.5 Attach the second filter assembly to the drain plug.

2.6 Attach the hose from the manifold to the Fill container.

2.7 Elevate the Fill container above the top of the package.

2.8 Close all valves on the manifold.

2.9 Fill the Fill container with water approximately equal in volume to the remaining void in the package. (The remaining void is a function of the volume of the sources and the source carriers. The total void volume is 0.6 ft^3.)

2.10 Open the valve connecting the Fill container to the package and allow the package to fill.

2.11 Close the valve connecting the Fill container to the package when the filling is complete.

2.12 Let water stand for at least 10 minutes.

2.13 Open the drain valve and drain the water through a filter. (CAUTION: Water will be thermally hot.)

2.14 Allow filters to cool.

2.15 Remove the filters from the filter cartridge and count the activity of them together.

2.16 For contents that are sources in Special Form, if the activity exceeds 0.005 µCi, return to Step 7. For all other contents, the activity limit will be set by Neutron's RSO on a case-by-case basis.

2.17 Notify Neutron's RSO if the activity remains above 0.005 µCi after five flushes.