

# NEUTRON PRODUCTS inc

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September 21, 1993

Mr. Cass R. Chappell  
Storage and Transport Systems Branch, NMSS  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Re: Certificate of Compliance Number 9102, Docket Number 71-9102

Dear Mr. Chappell:

Neutron Products hereby applies for renewal of the subject Certificate of Compliance, which has an expiration date of October 31, 1993. The Model Number NPI-20WC-6 shipping packages covered by this certificate are continuing to be used in regular service and have been free of problems.

The packages covered by the subject certificate are operated, tested, and maintained in accordance with the enclosed procedures.

Very truly yours,

NEUTRON PRODUCTS, INC.

*Frank Schwoerer*  
Frank Schwoerer  
Vice President

Enclosures

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### OPERATING PROCEDURES

This chapter describes the operating procedures, inspections, tests, and special preparations used in loading and unloading the shipping package. These procedures are in place and utilized for handling the existing teletherapy package. In all cases, evaluation of the procedures, inspections, etc. have demonstrated the ability of the shipping package to comply with the applicable operating procedure requirements specified in 10 CFR 71, Subpart G. Based on these evaluations, occupational radiation exposures are maintained as low as reasonably achievable, as required by Paragraph 20.1(C) of 10 CFR 20.

#### Procedure for Loading the Shipping Package

The source is loaded into the shipping/transfer cask in the hot cell according to NPI routine loading procedure, R 2014, a copy of which is appended. The loaded source is shielded by either the tungsten or lead in the center region of the drum, depending upon the type of drum being used, and the remaining lead shielding of the cask.

The cask is always handled dry and there is no liquid coolant. Special procedures to prevent moisture from being present in cavities designed to be dry are not necessary. Decontamination is performed, if necessary, before the source is placed in the cask. After removal from the hot cell, radiation measurements are taken at the outside surface of the shipping/transfer cask to assure that permissible levels are not exceeded.

After the radiation survey and any decontamination, if necessary, the cask is placed in the overpack. The Wooden Protective Jacket cover is bolted in place and then the cover of the Steel Shell is bolted in place.

The shipping package is then placed on the transport vehicle by use of a forklift, or suitable lifting arrangement, and secured with tie down devices.

The quality assurance checklist is included in the Radioactive Shipment Record (RSR). The RSR is prepared for each shipment and provides the record for applicable external radiation monitoring and surface contamination measurements that must be acceptable before shipment is permitted.

Field loading requires no additional special procedures, except those associated with assembly and servicing of the specific teletherapy unit.

#### Procedures for Unloading the Shipping Package

The cask and overpack are dry and the cask contains only encapsulated sources. These sources are monitored prior to being loaded for shipment.

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There is very little chance of contamination during transport. Procedure R 2014 also includes the unloading of the shipping container at Neutron Products. Procedures for the unloading of specific teletherapy sources at medical institutions are included in the field servicing and installation procedures for those units. In accordance with these procedures, the shipping package is visually inspected for damage and external radiation measurements and contamination measurements are made prior to unloading.

#### Preparation of an Empty Shipping Package for Transport

The shipping package is not normally transported empty. In the event such a shipment occurs, standard procedures, as described in preceding sections of this chapter, are followed to confirm that the packaging is not contaminated (or decontaminated, if necessary), the Cover Assembly gaskets are intact, and the Cover Assemblies are securely bolted. Procedure R 2014 includes handling of an empty cask.

The casks are shipped dry and the free volume within the cask is so small that any moisture that might be formed by condensation during transport would be negligible. Freezing temperatures will not cause damage to the cask cover gaskets.

ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

The sections presented in this chapter are in conformance with applicable items of 10 CFR 71, Subpart H, Quality Assurance. In addition, Neutron Products has a complete and approved Quality Assurance Program, which addresses all the numbered items of Subpart H.

The shipping package design that is the subject of this application has been successfully in service at Neutron Products for 19 years. To confirm the adequacy of the shipping packaging, a thorough series of inspections, measurements, and a set of as-built drawings have been made to determine that the packaging is in accordance with the drawings and specifications. In addition, tests were performed during fabrication of each package to confirm leak tightness of lead containing cavities and the shielding integrity.

Acceptance Tests

The entire shipping packaging, i.e., the components of the shipping/transfer cask, the Wooden Protective Jacket, and the outer Steel Shell, have been inspected in accordance with the following quality assurance provisions:

- Inspection of all quality conformance activities is performed under the responsibility of the QA manager. Inspection personnel are independent of those performing the work. The inspections are performed by personnel qualified in accordance with the company's training program.
- Operating and QA procedures identify, where applicable, mandatory inspection hold points for witness by an inspector. Surveillance during fabrication, inspection, testing, and shipment of purchased materials, equipment, and components is maintained to assure conformance with specifications. Suppliers are required to furnish documentation that identifies the purchased material or equipment and the specific procedure requirements (e.g., codes, standards, and specifications) met by safety related items.

Receiving inspections of the supplier furnished material, equipment, and services were performed to assure:

- The material, components, or equipment is properly identified and corresponds with the identification on receiving documentation.
- Material, components, equipment, and records are inspected and judged acceptable in accordance with the package specifications prior to installation or use.

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- Inspection records or certificates of conformance attesting to the acceptance of material and components are available prior to equipment installation or use.
- Items accepted and released are identified as to their inspection status.

#### Visual Inspections

Visual inspections were conducted to insure that the packaging is in conformance with the drawings and specifications.

Welds, which are part of the boundary of the lead containing cavities of the inner container, were inspected using liquid penetrant in accordance with ASME B & PV Code, Section V. This includes the Drums, Covers, and the Shell Assembly. Any evidence of weld cracking was repaired by removal of the metal in the indicated region and satisfactorily rewelding the joint. Acceptance criteria are in accordance with ASME B & PV Code, Section VIII, Division 1, Appendix 8.

In addition to dimensional checks, visual inspection of the Wooden Protective Jacket included proper bonding of the plywood sheets and installation of the reinforcing rods. The outer Steel Shell was visually inspected for weld quality.

#### Structural and Pressure Tests

Not applicable

#### Leak Tests

In fabrication of the inner container, the chambers containing lead shielding were leak tested before filling to assure containment integrity. Leak tests of the inner container closure are not required in normal service.

#### Component Tests

Not applicable

#### Tests for Shielding Integrity

Before delivery, the inner container was tested and inspected by nondestructive means and evidence submitted to show that the required homogeneity of shielding is provided to meet the shielding specifications. The outer surface of the cask was surveyed with a cobalt-60 radiation source in the central chamber. As a minimum, a 14 point survey was made (on the surface face intersecting each of the principal axes, plus the central point on the face of each octant defined by the three principal planes containing the center of the spherical shell) and the values recorded. No areas showed surface radiation more than 15% above the average, where lead shielding thickness is comparable.

Thermal Acceptance Tests

Not applicable

Maintenance Program

The shipping package does not contain liquid shielding, coolant, valves, pressure gages, rupture disks, etc., thereby simplifying regular maintenance. In addition to periodic routine visual inspections, the following routine maintenance is performed in accordance with NPI Procedure R 2019, a copy of which is appended.

- Components of the package are checked for contamination when it is being loaded or unloaded and decontamination is effected as required.
- When the end covers are installed or removed, the condition of the silicone gasket is inspected and the gasket is replaced when checking, hardening, deterioration, or any damage is observed. The gaskets are replaced within a 12 to 18 month period in any event.
- Prior to each use, the Wooden Protective Jacket is inspected for defects, or conditions potentially leading to defects, such as loss of plywood bonding, cracking, waterlogging, excessive drying, corrosion of the steel rods, or any body or cover warping that would result in an inadequate cover seal. Should any of these conditions be observed, the situation shall be evaluated and a repair made, or the Wooden Protective Jacket taken out of service.
- The overpack Wooden Protective Jacket and Steel Shell are inspected for damage when being put into, or taken out of, service. Spare parts are kept in stock and replacement or repair is made as required.


TELETHERAPY SHIPPING/TRANSFER CASK  
UNLOADING AND LOADING PROCEDURE

PROCEDURE R 2014


REVISION 5

SEPTEMBER 15, 1992

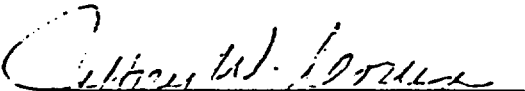
Reviewed for Radiation Safety,  
and Approved

  
Marvin M. Turkanis  
Date 9/15/92

Reviewed for Compliance and Approved

  
Frank Schwoerer  
Date 9/15/92

Reviewed for Adequacy for Intended  
Purpose, and Approved

  
Jeffrey W. Corum  
Date 9/15/92

Control Copy Number: 01

TELE THERAPY SHIPPING/TRANSFER CASK  
UNLOADING AND LOADING PROCEDURE

PROCEDURE R 2014

REVISION 5

SCOPE

The teletherapy shipping package, NPI-20WC-6, consists of a specially designed inner lead shielded shipping/transfer cask contained within an overpack. This procedure covers hot cell unloading and loading of doubly encapsulated sources out of, and into, the approved shipping/transfer casks, and shall be used in conjunction with Procedure R 5001, General Procedure for Hot Cell Operations. Enclosure of the cask within the overpack and unloading and loading the shipping package is included in the procedure. For operations at other hot cells, this procedure will be modified as necessary.

BACKGROUND

Both unloading and loading is covered here in a single procedure because the most frequent circumstance in the shipping and transfer of teletherapy sources is receipt of a package containing a spent source which, after appropriate initial operations and surveys, is removed from the package in the hot cell and placed in interim storage; whereupon the cask is inspected, cleaned, resleeved, as necessary, and loaded with a new source in the hot cell for subsequent shipment off site. Loading an initially empty container and similarly, unloading a container to be placed into standby or serviced in an empty condition, are included as variations of the procedure.

1. REFERENCES

Procedure R 1002, Sampling Procedure  
Procedure R 5001, General Procedure for Hot Cell Operations  
Procedure R 5002, Opening Hot Cell Door After Processing Single and  
Double Encapsulated Cobalt-60  
Procedure R 5015, Operation of the Hot Cell Interlock  
Applicable Certificate of Compliance (for domestic destination) or  
Certificate of Competent Authority (for foreign destinations) for  
the shipping package  
QA 1003, Package Loading Procedure for Radioactive Materials  
QA 1004, Package Unloading Procedure for Radioactive Materials

2. GENERAL CONSIDERATIONS

Sources shall be loaded only upon written instruction, after it has been determined that the sources meet all specifications, including customer's, and cask loading specifications.

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The shipping packages usually contain radioactive material upon receipt and all procedures and precautions associated with handling radioactive materials must be followed.

### 3. PERSONNEL AND SUPERVISION REQUIREMENTS

Radioactive materials may be loaded or unloaded from transfer containers only by experienced hot cell operators, acting under the authority of the hot cell manager or the radiation safety officer (RSO), or his designee.

### 4. EQUIPMENT

Operating hot cell  
Shipping/transfer cask  
Shipping/transfer cask applicable inserts  
Survey meter capable of reading up to 2 R/hour  
All necessary tools

### 5. OPERATIONS

#### 5.1 Preparations

5.1.1 Confirm with the hot cell manager, or other individual responsible for the shipment, the following:

- a) source(s) identification;
- b) activity of source(s);
- c) applicable shipping/transfer cask and source holder; and,
- d) applicable overpack (wooden protective jacket and steel shell).

5.1.2 For shipment received, unload the NPI-20WC-6 package from the truck in accordance with QA 1004.

5.1.3 Remove bolts and lids from the steel shell and wooden protective jacket, respectively. Store for reuse.

5.1.4 Remove shipping/transfer cask from the overpack. Do not leave wooden protective jacket open to weather. Inspect overpack for damage and repair, if necessary. Store overpack for next use with wooden lid and shell cover in place.

5.1.5 Measure radiation levels to confirm that handling of cask will be a low level operation.

5.1.6 Open hot cell door per Procedure R 5015.

- 5.1.7 Place the shipping/transfer cask on the dolly in the machine shop. Manually move dolly from the machine shop to the area behind the hot cell and under the crane trolley. Lift shipping/transfer cask to sufficient height and center it over the hot cell dolly. Lower cask onto the hot cell dolly. Disengage the crane trolley and remove it to its original position.
- 5.1.8 Remove bolts holding one of the shipping/transfer cask covers. Make certain end of cask faces shielded area when removing cover.
- 5.1.9 Confirm whether the cask contains a source by both measuring the radiation level near, and visually inspecting inserts at, the open face of the container. Any reading above background should be considered as indicating a loaded container.
- 5.1.10 If shipping/transfer cask is loaded, proceed to 5.1.12.
- 5.1.11 If shipping/transfer cask is empty, remove inserts, clean the inside of the container, check drum rotation (where applicable), wipe test the inside of the container and inserts, and reinstall applicable inserts.
- 5.1.12 Load shipping/transfer cask, appropriate insert or holder, and all necessary tools into cell.
- 5.1.13 Close hot cell door.
- 5.1.14 If shipping/transfer cask is empty, proceed to 5.3.
- 5.1.15 If shipping/transfer cask is loaded, proceed to 5.2.

## 5.2 Unloading

- 5.2.1 If container is loaded, remove source holder and remove source from holder.
- 5.2.2 Visually inspect source for damage and evidence of failure of source integrity.
- 5.2.3 Wipe test source.

5.2.4 Acceptability for source storage:

- 5.2.4.1 If the source passed the visual examination and if the removable contamination determined by the wipe test is less than 0.05 uCi, place the source in storage and note in the inventory record.
- 5.2.4.2 If the removable contamination, as determined by wipe test, is greater than 0.05 uCi, the source should be visually re-examined. If the examination reveals no sign of cladding failure, decontaminate and wipe test again. If the results of the wipe test after decontamination is less than 0.05 uCi, the source shall be considered acceptable and placed in storage.
- 5.2.4.3 If there is any sign of cladding failure, or if the wipe test after decontamination is greater than 0.05 uCi, notify the production manager and establish the corrective action to be taken to prevent significant contamination in storage. Note condition and action taken in the hot cell log.

- 5.2.5 Open hot cell door using referenced procedures and move empty cask into the hot cell access area.
- 5.2.6 If the empty cask is to be reloaded for outgoing shipment, proceed to Step 5.1.11.
- 5.2.7 If the empty cask is to be shipped empty or taken out of service, remove inserts, clean the inside of the container and wipe test both the inside of the container and the inserts.

The inside surface of the shipping/transfer cask and the inserts should not exceed a count rate of 500 dpm per 100 cm<sup>2</sup> on the wipe tests; clean and rewipe as necessary to meet this limit.

- 5.2.8 If the empty cask is to be shipped empty, install inserts (if appropriate), and bolt gasketed covers into place. Tighten bolts to firmly compress the gasket (approximately 100 inch-pounds torque). Insure requirements of 49 CFR 173.427 regarding shipment of empty radioactive packaging materials are met. Proceed to Step 5.3.10 or an alternative special procedure.

- 5.2.9 If the empty cask is to be taken out of service, install the covers along with any internals to be stored and place the cask into storage.

### 5.3 Loading

NOTE: Before loading, make certain that all applicable preparation steps, starting with 5.1, are completed.

- 5.3.1 Remove completed and inspected source from storage.
- 5.3.2 Visually inspect source for damage and evidence of failure of source integrity.
- 5.3.3 Wipe test source.
- 5.3.4 Acceptability for source shipment:
- 5.3.4.1 If the source passed the visual examination and the removable contamination, as determined by the wipe test, is less than 0.001 uCi, the source is acceptable for shipment.
- 5.3.4.2 Repeated decontamination and wipe testing is acceptable in meeting criteria.
- 5.3.5 Load source into appropriate holder and the holder into the designated position in the shipping/transfer cask.
- 5.3.6 Record the identification and location of each source in the cask.
- 5.3.7 Open the hot cell door using the referenced procedures.
- 5.3.8 Place cover on the shipping/transfer cask.
- 5.3.9 Remove shipping/transfer cask from hot cell and tighten bolts to firmly compress the gasket (approximately 100 inch-pounds torque).
- 5.3.10 Decontaminate the shipping/transfer cask.
- 5.3.11 Wipe test shipping/transfer cask and decontaminate as necessary.

- 5.3.12 Measure and record maximum radiation levels at surface and at 1 meter (3.3 feet).
- 5.3.13 Complete and place appropriate label on the shipping/transfer cask.
- 5.3.14 Load shipping/transfer cask into the overpack and install wooden protective jacket cover. Bolt cover firmly into place, making certain that all thread reinforcement rod ends remain recessed at least 1.5 inches below the surface of the wooden protective jacket.
- 5.3.15 Bolt overpack steel shell.
- 5.3.16 Fit steel shell cover and bolt into place.
- 5.3.17 Affix appropriate labels for the shipment and load the NPI-20WC-6 package onto the truck in accordance with QA 1003.

## 6. RECORD REQUIREMENTS

### 6.1 The hot cell logbook shall contain:

- identification of the cask that has been loaded;
- identification and in-cask location of sources that have been loaded;
- name of operator;
- results of all wipe tests and results of source inspections; and,
- dose received by operator as read on the dosimeter.

### 6.2 Make the appropriate entry into the inventory record.

### 6.3 The hot cell manager shall review the hot cell logbook for compliance with the procedure at least once a day and shall either indicate its adequacy by initialling at the end of each day's entry or shall note and initial any inadequacy. The radiation safety officer shall review the hot cell logbook at least weekly and shall make similar notations.

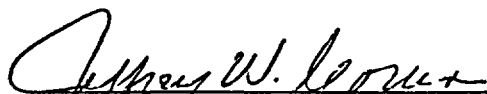
TELE THERAPY SHIPPING PACKAGE  
MAINTENANCE PROCEDURE

PROCEDURE R 2019

REVISION 0

OCTOBER 27, 1992


Reviewed for Adequacy for Intended  
Purpose and Approved

  
Jeffrey W. Corum  
Date 10/27/92


Reviewed for Radiation Safety  
and Approved

  
Marvin M. Turkanis  
Date 10/27/92

Reviewed for Compliance and Approved

  
Frank Schwoerer  
Date 10/27/92

Quality Assurance Review

  
Catherine M. O'Brien  
Date 10-27-92

Control Copy Number: 0907

TELE THERAPY SHIPPING PACKAGE  
MAINTENANCE PROCEDURE

PROCEDURE R 2019

REVISION 0

SCOPE

Neutron Products' teletherapy source shipping packages, Model Nos. NPI-20WC-6, NPI-20WC-6 MkII, and U.S. DOT Type 20WC-6, consist of a DOT Specification 20WC wooden protective jacket with a single, snug-fitting inner container (a lead shielded shipping/transfer cask). The maintenance program for these shipping packages is the subject of this procedure.

1. REFERENCES

NPI Procedure R 2014, Teletherapy Shipping/Transfer Cask, Unloading and Loading Procedure  
U.S. NRC Certificates of Compliance Nos. 9102 and 9215  
U.S. DOT Certificates of Competent Authority Nos. USA/5800/B and USA/9215/B(U)  
U.S. DOT Regulations, 49 CFR 173.416(f)  
NPI Quality Assurance Program for Radioactive Material Packages, U.S. NRC Approval No. 0121

2. GENERAL CONSIDERATIONS

- 2.1 Inspections/tests are performed each time a shipping package is disassembled and assembled for shipment. If these inspections/tests reveal the need to replace parts or to repair the shipping package, the work is either done immediately or the package is taken out of service until repairs are accomplished.
- 2.2 A few components of the packages are replaced at intervals of at least 12 to 18 months, even though inspections/tests indicate that they are in a fully functional condition.
- 2.3 All maintenance work done on teletherapy shipping packages is performed under Neutron Products' NRC-approved Quality Assurance Program. Repairs are documented in a teletherapy shipping package log.

3. PERSONNEL AND SUPERVISION REQUIREMENTS

Inspection and maintenance of teletherapy shipping packages may be performed only by qualified individuals, acting under the authority of the hot cell manager or the radiation safety officer (RSO), or their designee(s).

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#### 4. EQUIPMENT

General:

Forklift truck and lifting slings  
Wipes and radiation counter to determine smearable, removable activity

Shipping/transfer cask:

Spare parts inventory  
Applicable inserts for drum  
Special tools

Overpack:

Spare parts inventory  
Special hardware as necessary  
Special tools

#### 5. MAINTENANCE PROGRAM

##### 5.1 Surface Contamination

The shipping/transfer cask and the overpack are to be wipe tested for surface contamination prior to shipment from Neutron Products and prior to unloading, when a package is received from a facility that has unsealed cobalt-60. Decontamination is to be effected as required to meet U.S. DOT criteria for shipment.

##### 5.2 Shipping/Transfer Cask

5.2.1 The two gaskets on the shipping/transfer cask are to be inspected whenever the end covers are installed or removed. The gasket(s) shall be replaced if checking, hardening, or any damage is observed. Regardless of their condition, the gaskets shall be replaced after 12 to 18 months of use.

5.2.2 Each shipping/transfer cask is to be inspected annually.

##### 5.3 Wooden Protective Jacket

5.3.1 Prior to each use, the wooden protective jacket is to be inspected for defects or conditions potentially leading to defects. The conditions of concern include loss of plywood bonding, cracking, waterlogging, excessive drying, corrosion of the steel rods, or warping that causes an inadequate cover seal. If any of these conditions is observed, the situation



shall be evaluated and, if relevant to satisfactory performance of the package, immediate repairs shall be made or the wooden protective jacket taken out of service until repairs are accomplished.

5.3.2 Each wooden protective jacket shall be weighed annually.

#### 5.4 Outer Shell

The steel outer shell of the overpack is to be examined visually after receipt of a shipment at Neutron Products and prior to the next use. Any defects shall be corrected or the shell taken out of service until repairs are accomplished.

#### 5.5 Package Repairs

5.5.1 Minor repairs that can be effected by replacement of parts from the inventory of spares may be made in the course of package loading or unloading operations.

5.5.2 If major repairs are necessary, the package (or components thereof) shall be taken out of service until repairs are accomplished.

5.5.3 Repairs are to be made by qualified employees or vendors, working under and in compliance with Neutron Products' Quality Assurance Program.

#### 5.6 Records

A documented record is to be maintained of all package repairs. This record may be in the form of a logbook for teletherapy shipping package maintenance.