NEUTRON PRODUCTS INC

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17 October 2012

U.S. Nuclear Regulatory Commission, Region 1
2100 Renaissance Blvd, Suite 100
King of Prussia, PA 19406-2713
Attn: Mr. Dennis R. Lawyer, Health Physicist
Commercial and R&D Branch
Division of Nuclear Materials Safety

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REC RG1 OCT 18'12 AM11:19

Re: Mail Control No. 579038
License No: SUB-1551

Dear Mr. Lawyer,

I am writing in response to your Request for Additional Information dated September 19, 2012. Our numbered responses match the numbered paragraphs in your letter.

1. In addition to being the RSO named on the referenced license, Mr. DeRosa is also the manager of that division, and has long been recognized as a representative of Neutron's management. That said, I reviewed the application at the time of its submittal, and was in agreement with the statements and representations contained therein. Since receiving your letter, I have reviewed the information again and my position has not changed.

2. Thank you for raising this issue. In addition to Mr. Jerry Fogle, we request that Mr. Edmond DeRosa, Mr. Kenric Tingle, and Mr. Leslie Forrest also be named as Authorized Users on the referenced SUB-1551 license. Mr. DeRosa is the RSO of the SUB-1551 and 19-25203-01 licenses, and Mr. Fogle, Mr. Tingle, and Mr. Forrest are all licensed source handlers and are named users on Neutron's other license 19-25203-01 issued by the NRC. Their qualifications as licensed source handlers are further described in the attachments hereto, as explained in our responses below.

3. For the individuals working in this division, an important part of the radiation safety training program is our Teletherapy Source Handler Training Program, a copy of which is attached. A description of the topics covered can be found in Section 4 of the Program. The groups of workers are described in Section 1. The assessment of training (and periodic retraining) is addressed in Sections 1.3.4, 1.4.5, and 2.5. The qualifications of instructors is addressed in Sections 1.3.2, 1.4.4 and 3.2. The method and frequency of training are addressed in Sections 1 and 2.

   Generally, those individuals assigned to work on activities associated with the SUB-1551 license are involved in teletherapy field service operations, which is why this response has been focused on that program. However, more generalized training is described in Section 17 of our Radiation Protection Program for Teletherapy Operations, a copy of which has also been attached.

579038

NMSS/RGN1 MATERIALS-002

4. Information regarding survey instruments and their calibration is also included in the aforementioned Radiation Protection Program for Teletherapy Operations in Section 16. The topic is also addressed in Section 3 of Neutron's program entitled Control of Occupational Exposure in Teletherapy Operations, a copy of which has been attached. Neither of these documents specify which instruments in particular are to be used, but rather discuss the requirements of survey instruments more generally in order to provide flexibility for those implementing the program to be able to use the appropriate survey equipment for the task at hand.

   For some applications, more specificity is provided for survey instruments, such as in Section VI of Neutron's Procedure P-9, Procedures for Source Transfer, Maintenance, and Service Associated with Teletherapy Devices, a copy of which has been attached.

   We generally perform the calibration of our own survey meters ourselves, in accordance with our Procedure R-1007, Calibration of Radiation Survey Meters and Area Monitors, a copy of which has been attached. Periodically, we also use the services of third party calibrators (including survey instrument manufacturers), who are qualified to perform such work. We reserve the right to upgrade our survey instruments as necessary and change calibration services to other authorized providers.

5. Material accountability for our SUB-1551 license is addressed in Neutron's Procedure R-2503, Receipt and Storage of Depleted Uranium and Teletherapy Units, a copy of which is attached.

6. Occupational exposure is addressed in Neutron's document entitled Control of Occupational Exposure in Teletherapy Operations, which is referred to above. In particular, Sections 4.1 and 9.6 address the issue for the Ranson facility, which is the subject of the SUB-1551 license. These sections support our statement that we have done a prospective evaluation and determined that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits in 10 CFR Part 20.

7. Regarding operating and emergency procedures, please see Section III of the attached P-9, Procedures for Source Transfer, Maintenance, and Service Associated with Teletherapy Devices which describes Neutron's emergency procedures for teletherapy operations. In addition, procedures will be revised only if: (1) the changes are reviewed and approved by the licensee management and the RSO in writing; (2) the licensee staff is provided training in the revised procedures prior to implementation, (3) the changes are in compliance with NRC regulations and the license; and (4) the changes do not degrade the effectiveness of the program.

Thank you for the reminder concerning the NRC's commitment to the Safety Culture Policy Statement. We are well aware of the Policy Statement and, within the company, we have conducted safety culture training and recognize that the implementation of a positive safety culture is - by definition - a work in progress which is always subject to complacency and which can never be considered complete.

I believe this letter to be totally responsive to the issues you have raised. If, however, you need additional information please do not hesitate to contact me or Ed DeRosa.

Sincerely,

Bill Ransohoff
Director of Operations
Neutron Products inc

NEUTRON PRODUCTS, INC. (Neutron)
TELETHERAPY SOURCE HANDLER - TRAINING PROGRAM
LICENSES: 19-25203-01 and SUB-1551

Revision 1

Effective Date: July 8, 2010

This Program is for Source Handlers who are authorized under Neutron's 19-25203-01 license, and are actively performing such work in the United States.

1.1 Neutron will formalize its classroom and "on job training" training programs for all Source Handlers. Neutron's Source Handlers are authorized to perform all licensed service and inspection functions on cobalt-60 teletherapy units, which includes:

1.1.1 Normal servicing and maintenance of the unit, including when the source is in the "open" position;

1.1.2 Removal or installation of teletherapy sources;

1.1.3 Unit installations and removals.

1.2 Neutron will provide one day of classroom training for:

1.2.1 All licensed Source handlers; and,

1.2.2 Current Source Handler trainees.

This training program is not mandatory for individuals who are not named on Neutron's 19-25203-01 License. Examples of such individuals are truck drivers, riggers, electricians, customer medical physicists, customer RSO, and Customer HP technicians.

1.3 Training

1.3.1 All Source Handlers must be physically present at a designated location for the training.

1.3.2 The following are qualified trainers:

1.3.2.1 Active and former licensed Source Handlers for Neutron or other organizations;

1.3.2.2 Licensed Radiation Safety Officers or ex-RSOs;

1.3.2.3 Neutron's President;

1.3.2.4 Outside consultants, who professionally offer training in the fields of health physics, medical physics, quality assurance, shipping of hazardous materials and/or medical equipment; and,

1.3.2.5 Relevant regulatory agencies' representatives.

1.3.3 Neutron shall prepare training materials and will periodically update them based on experience with the training program and work performed under this license.

1.3.4 Source Handlers shall be required to take proficiency tests from time to time, either written or physically demonstrated, or both.

1.4 Neutron shall establish on the job training (OJT) protocols for new Source Handlers.

1.4.1 The required OJT for a new Source Handler shall be the relevant experience acquired during:

1.4.1.1 A total of ten documented relevant experiences which have been performed under Neutron's 19-25203-01license or as a source handler for another organization; and,

1.4.1.2 Five source unloading and loading sequences of a specific source holder type, at least one of which shall be with a radioactive cobalt-60 source;

OR

1.4.1.3 The remanufacturing of two teletherapy units of any model under the direction of a Source Handler; and

1.4.1.4 Five source unloading and loading sequences of a specific source holder type, at least two of which shall be with a radioactive cobalt-60 source.

1.4.2 A relevant experience is a source installation, source removal, unit installation or unit removal with a radioactive cobalt-60 source.

1.4.3 Each new Source Handler shall also be adequately trained in the same topics listed for classroom training, (see Section VI) either at Neutron or another organization.

1.4.4 The individuals giving OJT shall be:

1.4.4.1 Individuals who are or have been an approved Source handler for Neutron; or

1.4.4.2 A source handler for other organizations; or,

1.4.4.3 A licensed Radiation Safety Officer.

1.4.5 OJT shall have established passing criteria and a record of the training shall be documented, signed and dated by trainer and RSO.

1.4.6 OJT testing results shall be maintained for NRC inspection review.

2. Retraining

2.1 All Source Handlers shall participate in Annual classroom retraining and retesting.

2.2 The RSO shall certify that Source Handlers are competent in their specific duties.

2.3 Neutron shall document the scope of training. (Multiple certifications may be put on one sheet).

2.4 Neutron shall document the qualifications of trainers and outside consultants, if any.

2.5 Neutron shall document the results of written tests which shall be signed by the trainee and the RSO and maintained, for NRC inspection.

2.6 The RSO may waive the 12 - month training provided that the Source Handler has attended 3 training sessions in the prior 39 months and provided that the RSO documents the reason for the waiver.

2.7 Special Retraining

2.7.1 Prior to each source exchange in a unit of a specific manufacturer for which an individual is licensed by Neutron's 19-25203-01license, but who has not performed a source exchange or unit removal in such a unit within the prior 12 months, the named individual shall review the applicable Appendix of P-9 with the RSO or another Source Handler who shall document the review and make it available to the NRC for inspection.

3. Company certification of authorization specific to level of training:

3.1 Neutron shall maintain records of all training under this program, both didactic and OJT.

3.2 Certifications of qualification of the trainers may be maintained on one document.

3.3 All documents shall be available for NRC inspection review.

4. Topics that may be covered in classroom retraining (not all-inclusive):

4.1 REVIEW OF FUNDAMENTLS

4.1.1 Importance of training

4.1.2 Atomic structure

4.1.3 Atomic radiation (alpha, beta, gamma)

4.1.4 Radiation units

4.1.5 Devices used to measure radiation dose and exposure rate

4.1.6 Radiation protection fundamentals (ALARA)

4.1.7 Biological effects of ionizing radiation

4.1.8 NRC Reg Guide 8.29

4.1.9 Output of Cobalt-60 sources

4.2 TOPICAL SUBJECTS

4.2.1 Procedures specific to each activity to be certified

4.2.2 Case studies (emphasizing incidents) and source related problems

4.2.3 Emergency planning

4.2.4 NRC radiation regulations

4.2.5 Reciprocity responsibilities

4.2.6. Role of the Regulatory Authority

4.2.7. Importance of timely and accurate reporting

4.2.8. Team responsibilities

Note: Changes made in Revision 1

- Changed the effective date
- Removed footnotes

Radiation Protection Program for Teletherapy Operations
Neutron Products, Inc.
Licenses: 19-25203-01 and SUB-1551

Revision 1

Effective Date: July 8, 2010

Reviewed for Policy and Content,
and Approved

William Ransohoff
Director of Operations

17 October 2012
Date

Edmond DeRosa
Radiation Safety Officer, Teletherapy

Oct. 17, 2012
Date

Principal Author: Edmond DeRosa

Change Record - This document replaces Neutron Products, Inc., Radiation Protection Program Revision 0.

This is a controlled document and as such shall only be modified in accordance with the latest revisions of Procedure C 9000, *Preparation of Quality System Documents and Data*, and Procedure C 9001, *Document and Data Control*. This document is valid for internal use only after it has been reviewed and approved with dated signature by all of the above listed authorized personnel.

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Radiation Protection Program for Teletherapy Operations
Neutron Products, Inc.
Licenses: 1925203-01 and SUB-1551

Revision 1

1 Introduction

1.1 Scope

This Radiation Protection Program applies to activities conducted under United States Nuclear Regulatory Commission Radioactive Materials Licenses 19-25203-01 and SUB-1551. These include licensed operations at the Ranson, West Virginia facility and teletherapy field operations.[1]

1.2 Background

In the past, Neutron Products' performed teletherapy service operations which include field source installations and removals under State of Maryland Radioactive Material License MD-31-025-03. In addition, Neutron manufactured cobalt-60 sources and operated two panoramic gamma irradiators at its Dickerson, Maryland headquarters under other State of Maryland licenses. A second facility located in Ranson, West Virginia housed the teletherapy field services and unit reconditioning department and was licensed by the NRC under SUB-1551 to possess and store depleted uranium which is often used as shielding in teletherapy units. On June 24, 2009, the Maryland Department of the Environment informed Neutron of its decision not to renew MD-31-025-03 (which had remained under timely renewal status since September 13, 2000), under the rationale that there were no longer any cobalt-60 teletherapy units remaining within the state and field operations could not be inspected. Accordingly, Neutron requested the NRC to amend SUB-1551 to include teletherapy field operations once licensed by Maryland, however, rather than amending the existing SUB-1551 license, the NRC issued a new license 19-25203-01 for teletherapy field service operations.

10CFR Part 20 at Section 20.1101(a) requires radioactive material licensees to, "develop, document, and implement a radiation protection program commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part." Maryland's COMAR 26.12.01.01, *Regulations for the Control of Ionizing Radiation,* contains similar requirements. Previously, Neutron consolidated all radioactive protection operations licensed by Maryland under a single *Radiation Protection Program.* This document replaces that program for teletherapy field operations and the Ranson facility with a stand-alone program which is commensurate with the

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[1] Teletherapy field operations include: installation and removal of teletherapy type units, installation and removal of radioactive sources from teletherapy type units, packaging and preparing sources for transport, and routine and emergency field service.

scope and extent of those activities and is uncomplicated by issues that effect only manufacturing and/or irradiator operation.

1.3 Nominative References

1.3.1 10 CFR Part 20, *Standards for Protection Against Radiation.*

2 Organization

2.1 Licenses

The five Radioactive Material Licenses under which Neutron Products' operations with radioactive materials are conducted are:

2.1.1 SUB-1551, which covers storage of depleted uranium teletherapy components at Ranson, West Virginia.

2.1.2 19-25203-01, which covers teletherapy field service operations.

2.1.3 MD-31-025-01 ("01 License"), which covers the manufacture of cobalt-60 sources and related activities[2] and is outside the scope of this program.

2.1.4 MD-31-025-04 ("04" License"), which covers the operation of the Dickerson II irradiator and is outside the scope of this program.

2.1.5 MD-31-025-05 ("05" License"), which covers the operation of the Dickerson I irradiator and is outside the scope of this program.

2.2 The Teletherapy Subdivision

Teletherapy and Ranson operations are a subdivision of Division III, Cobalt Operations.[3] The subdivision's operations are both domestic and international and include:

- Sales of teletherapy sources owned by Neutron, but possessed by other licensees,
- Shipment of sources, both Neutron's and other licensees', in Type B(U) containers subject to Neutron Products' approved Quality Assurance Program for Radioactive Transportation,

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[2] As of this writing manufacturing operations under the "01" license have been suspended by court order. Health physics and radiation protection activities remain in force.

[3] Division III also includes the suspended source manufacturing operations and associated plant and equipment located at Dickerson, MD.

- Field transfer of sources, both Neutron's and other licensees', to and from end-use equipment and transportation packaging,
- Field service of teletherapy equipment,
- Installation, relocation, and removal of teletherapy units,
- Refurbishing and sale of used teletherapy units, and
- Supply of parts and components for teletherapy units.

The subdivision operates primarily from the Ranson facility which houses the unit refurbishing operation, source handlers' offices, and warehousing for teletherapy components[4] and packaging. Sales and administrative functions operate primarily from Dickerson.

2.3 Key Personnel

2.3.1 The Radiation Safety Officer for Teletherapy (RSO - Teletherapy)

The RSO - Teletherapy has primary responsibility for radiation safety associated with teletherapy and Ranson operations licensed under 19-25203-01 and SUB-1551, and implementation of this program. He has independent authority to halt any operation which he considers as unsafe or unduly risky.

2.3.2 Licensed Source Handlers

Licensed Source Handlers are personnel who have been trained and authorized to conduct field source transfers and service for specific equipment and are named users under the 19-25203-01 and SUB-1551 licenses. Source Handlers are responsible for the safe handling of radioactive materials pursuant to documented procedures and have authority to halt any operation which they consider to be unsafe or unduly risky.

3 The Radiation Protection Program

3.1 Structure of Radiation Safety Related Documentation

3.1.1 Regulations - 10CFR Part 20 sets regulatory requirements.

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[4] Excluding cobalt-60 sources, but including components containing depleted uranium.

3.1.2 Radioactive Material Licenses 19-25203-01 and SUB-1551 defines scope of activities and sets limits on type, quantity, and uses of radioactive material. License amendments are issued by the U.S. NRC.

3.1.3 Radiation Protection Program - Required under 10CFR 20.1101(a), defines policies for achieving regulatory and license condition requirements. Sets action limits to provide margin against regulatory non-compliance. Specifies implementing procedures and programs, and conditions for their adequacy.

3.1.4 Specific Programs - Specified by the Radiation Protection Program and/or by regulation or other applicable standards. Defines policies and specifies procedures for specific aspects of radiation protection.

3.1.5 Procedures - Specified by the Radiation Protection Program or other programs. Defines scope, responsibility and authority, and requirements for individual operations. Level of instructional detail is dependent upon nature of the activity, personnel involved, and their level of training and autonomy. Detailed instructions may be provided for by referenced work instructions, checklists, flow-sheets, forms, etc.

3.2 Pertinent Radiation Protection Issues

3.2.1 Ranson - SUB-1551

The principal radiation protection issues at Ranson arise from the warehousing of teletherapy components containing depleted uranium (DU). The DU is encapsulated or otherwise sealed; contamination and airborne activity as of this writing have not occurred. DU is stored so as to reduce occupational exposure, and dose rates in the Ranson facility are a small fraction of those requiring personnel monitoring pursuant to 10CFR 20.1502. Dose rates at the fenced property boundary are indistinguishable from background; thus, exposure to members of the public is not at issue.

3.2.2 Teletherapy Field Operations - 19-25203-01

Transfer of sources to and from teletherapy units usually entails measurable external exposure to both the whole body and extremities, as would field service to a much lesser extent. Exposures are significant enough to require monitoring by 10CFR 20.1502(a). Cobalt-60 teletherapy sources may contain as much as 15,000 Ci so addressing the potential for significant accidental exposure is of paramount importance. Engineering and procedural controls must be maintained to minimize the possibility of accidental exposures. Transfer operations create a temporary high radiation area of short duration requiring control under 10CFR 20.1601. Because teletherapy sources are sealed special form,

airborne activity and surface contamination are not normally encountered.

Teletherapy units require extensive external shielding in order to protect personnel and members of the public from exposure during their routine operation. Generally, transfer operations are conducted within these shielded rooms and members of the public and nonessential personnel are not permitted access during these operations. Exposure to members of the public will not be significantly effected. For any source transfer performed outside of a shielded room, the establishment of an exclusion zone must be evaluated.

3.2.3 Transportation

Sources are shipped by Neutron in compliance with 10CFR Part 71 and applicable Department of Transportation and international regulations.

4 Review

4.1 Pursuant to 10CFR 20.1101(c), a documented review of this Radiation Protection Program and its implementation, shall be conducted no less often than annually.

4.2 The review shall be conducted by the RSO-Teletherapy with whatever assistance he deems necessary.

4.3 The review shall include, but need not be limited to:

4.3.1 An analysis of the content of the Radiation Protection Program and its implementing programs and procedures for adequately addressing the requirements of 10CFR Part 20.

4.3.2 An analysis of the implementation of the Radiation Protection Program and its associated procedures.

4.3.3 An analysis of occupational and public exposure resulting from licensed activities.

4.3.4 An analysis of the ALARA program per Sec. 5.

4.3.5 A discussion of events of major radiological significance occurring during the reporting period.

4.3.6 Copies of the review shall be distributed to executive management and authorized source handlers.

4.3.7 The documented review shall be retained in accordance with Sec. X and 10CFR 20.2102(a)(2).

5 ALARA Program

5.1 A documented program for maintaining exposures and releases "as low as reasonably achievable" (ALARA), as defined under 10CFR 20.1003, shall be established and maintained.

5.2 The ALARA program shall conform to:

5.2.1 United States Nuclear Regulatory Guide 8.10, *Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Reasonably Achievable*, Revision 1-R, May 1977

5.2.2 U.S. NRC NUREG 1530

6 Management Oversight

6.1 Radiation Safety Committee (RSC)

6.1.1 A Radiation Safety Committee shall be established for the purpose of management review and oversight of radiation safety and licensed activities. The RSC may be the same as that for Dickerson operations, a subcommittee of the same, or a wholly independent group.

6.1.2 The members of the RSC shall include as a minimum: the RSO - Teletherapy, the Quality Assurance Manager for Radioactive Transportation, at least one licensed source handler, and at least one representative of executive management. In addition, committee sessions may include as participants radiation protection, health physics, or other technical staff.

6.1.3 The RSC shall meet periodically as necessary, but no less often than annually. At least three committee members shall constitute a quorum.

6.1.4 The duties of the RSC shall include, but are not limited to:

6.1.4.1 Review of significant new or revised procedures implementing this Radiation Protection Program, or otherwise related to licensed activities.

6.1.4.2 Review and approval of new operations, activities, and equipment.

6.1.4.3 Evaluation of accidents and other unexpected events.

6.1.4.4 Discussion of radiation protection or related matters of topical concern.

6.1.5 Minutes of RSC meetings shall be documented.

6.2 Internal Audits

6.2.1 To the extent practical, RSO-Teletherapy shall conduct or cause to have conducted an annual field audit to investigate adequacy of procedures, training, monitoring and engineering controls.

6.2.2 A documented program for field audits shall be developed and implemented.

6.2.3 The Internal Audit Program shall, as a minimum, provide for:

6.2.3.1 Qualification of Auditors other than the RSO-Teletherapy.

6.2.3.2 Reporting and record keeping requirements

6.2.3.3 Corrective action

7 Occupational Exposure Control and Monitoring

7.1 A documented program for controlling and monitoring occupational exposure pursuant to 10CFR 20.1201 and 20.1502 shall be established and maintained.

7.2 As a minimum, the Occupation Exposure Program shall provide for:

7.2.1 Monitoring of whole body exposure and extremity exposure of teletherapy source handlers.

7.2.2 Use of self-reading dosimeters during teletherapy operations involving sealed sources.

7.2.3 Regular review of dosimetry results and a mechanism to minimize the possibility of overexposure.

7.3 To the extent that teletherapy or other Ranson based personnel receive occupational exposure at Dickerson or otherwise outside the scope of this program, that additional exposure shall be considered in limiting total annual exposure.

8 Public Exposure Control and Monitoring

Under routine operations, exposure to members of the public is sufficiently ALARA to require no additional active monitoring or control.

9 Planned Special Exposures

9.1 Prior to conducting any planned special exposure, as defined by 10CFR 20.1003, a documented procedure compliant with 10CFR 20.1206 shall be established and maintained for such purpose.

10 Control of Access

10.1 Ranson

No member of the public may be allowed unescorted access to the Ranson facility.

10.2 Temporary High Radiation Areas

During field transfer operations creating temporary high radiation areas of short duration, measures shall be taken to exclude unauthorized personnel from the effected areas. Generally, such controls will include appropriate posting and direct supervision in accordance with 10CFR 20.1601(b).

11 Respiratory Protection

Airborne radioactivity is not expected to result from licensed activities; the use of respiratory protection equipment is not anticipated; and no requirement for a respiratory protection program exists.

12 Storage and Control of Licensed Material

12.1 DU shall be stored at Ranson in a manner which maintains dose rates to accessible areas of the facility to less than 2 mRem in any one hour period and less than 50 mRem per year and furthermore to maintain exposures ALARA.

12.2 All radioactive material shall be stored in a manner likely to prevent unauthorized access, use or theft.

12.3 A documented inventory of DU under SUB-1551 shall be maintained.

12.4 Radioactive material temporarily possessed for the purpose of transfer to or from teletherapy units shall be controlled to prevent unauthorized access, use or theft. Material not in storage shall be maintained under constant surveillance in accordance with 10CFR 20.1802.

13 Precautionary Procedures

13.1 Identification and Posting of Radiation Areas

13.1.1 Appropriate surveys shall be conducted in order to identify and measure all radiation and high radiation areas.

13.1.2 Radiation and high radiation areas, as well as applicable areas containing radioactive materials shall be posted in accordance with 10CFR 20.1902 and 20.1903.

13.2 Labeling Containers

13.2.1 Containers of radioactive materials shall be labeled in accordance with 10CFR 20.1904 and 20.1905.

13.2.2 Packages of radioactive materials for transportation shall be labeled and marked in accordance with 49CFR 172.403 and 172.310.

13.3 Receiving and Opening Packages Containing Radioactive Material

13.3.1 Documented procedure(s) for receiving and opening packages containing radioactive material shall be established and maintained.

13.3.2 The procedure(s) shall comply with 10CFR 20.1906

14 Waste Management

14.1 Routine generation of radioactive waste is not expected.

14.2 Sec. 14.1 notwithstanding, in the event radioactive waste is generated, such waste shall only be disposed of in strict compliance with 10CFR 20. Subpart K.

15 Process Safety Control

15.1 Processes involving potential for substantial radiation exposure shall be designed and conducted in a way which maintains safe operating conditions, maintains a suitable level of supervisory control and reduces the possibility of significant exposure or release.

15.2 Where practical, facilities and equipment shall be designed, installed, and operated in a manner which assures the intent of 15.1. Where such engineering controls are impractical or ineffective, sufficient administrative controls shall be established and maintained.

15.3 Documented procedures shall be established and maintained for loading and unloading of shipping containers and teletherapy field operations.

16 Measurements

16.1 Radiation Survey Meters, Counters, and Related Equipment

16.1.1 Sufficient radiation surveying and counting instrumentation shall be maintained so as to sustain a capability for measurement and analysis as required under this program and its implementing procedures.

16.2 Calibration

16.2.1 All radiation survey meters and radiation area monitors shall be periodically calibrated no less than annually according to documented schedules and procedures established and maintained for that purpose.

16.2.2 Radioactivity counting instruments shall be calibrated as necessary against appropriate standards.

16.2.3 All outside vendors providing radiation calibrations shall be certified for that purpose.

16.2.4 Radioactive standards used for calibration should be, where possible or applicable, traceable to the National Institute for Standards and Technology. In the event such traceability is not possible or applicable, the criteria for selection of calibration standards should be justified and documented.

16.3 Dosimetry Services

16.3.1 All personnel and environmental dosimetry services with the exception of self-reading dosimeters shall be conducted by a qualified outside vendor.

16.3.2 All vendors of personnel and environmental dosimetry services shall hold current accreditation from the National Voluntary Laboratory Accreditation Program for the type of radiation being monitored.

16.4 Other

16.4.1 All other measuring and sampling equipment used for the purpose of radiation protection shall be used and calibrated in accordance with documented procedures and/or applicable manufacturers instructions.

17 Training

17.1 A documented training program(s) shall be developed and implemented.

17.2 The training program(s) shall:

17.2.1 Assure compliance with 10CFR 19.12

17.2.2 Be consistent with NRC Regulatory Guide 8.29

17.2.3 Provide for appropriate training in safe operations and emergency response.

17.3 New employee orientation

17.3.1 Upon inauguration of employment and prior to assignment in a radiation area, every employee shall receive instruction in:

17.3.1.1 Basic Aspects of Radiation

17.3.1.2 Radiation Risk Assessment

17.3.1.3 Fundamentals of Radiation Protection

17.3.1.4 Occupational Exposure Limits

17.3.1.5 ALARA

17.3.1.6 Emergency Response

17.3.2 In addition, to 17.3, all female employees shall receive instruction consistent with NRC Regulatory Guide 8.36 on:

17.3.2.1 Radiation limits to the embryo/fetus

17.3.2.2 Declared Pregnancy

17.4 Source Handlers

17.4.1 In addition to 17.3, Source Handlers shall receive training on:

17.4.1.1 Execution of Teletherapy job paperwork

17.4.1.2 Specification P-9 and all appendices

17.4.1.3 Procedure R-2014-G, Rev 1.

17.4.1.4 Applicable NRC & DOT Regulations

17.4.1.5 NRC Certificate of Compliance USA/9215/B(U)

17.4.1.6 DOT Certificate of Competent Authority USA/9215/B(U)

17.4.1.7 NPI Quality Assurance Program for the Transportation of Radioactive Materials

18 Document Control

18.1 This Radiation Protection Program and its implementing procedures shall be subject to document control to assure that the most current revision of any pertinent document is available at the point of use and that obsolete documents are withdrawn.

18.2 A documented procedure shall be established and maintained for document control.

19 Recordkeeping

19.1 All records generated under this program or its implementing programs and procedures; or pursuant to requirements of 10CFR Part 20, other applicable regulation, 19-25203-01, SUB-1551, or contract shall be legible and identifiable. Records shall be stored and maintained in such a way that they are retrievable and that minimizes the possibility of deterioration, damage, or loss.

19.2 Records subject to the requirements of 10CFR Part 20 or other applicable regulation within the scope of this program, shall be maintained for no less than the period required by the regulation.

19.3 All other records shall be maintained for a period of no less than three years unless otherwise specified.

19.4 Records may not be stored solely in electronic form.

Control of Occupational Exposure in Teletherapy Operations

Revision 1

Effective Date: July 8, 2010

Reviewed for Compliance and Safety,
and Approved

Edmond J. DeRosa
Radiation Safety Officer, Teletherapy

Oct. 17, 2012
Date

Jerry L. Fogle

OCT. 17, 2012
Date

Principal Author: Edmond J. DeRosa

Change Record - This document replaces Control of Occupational Exposure in Teletherapy Operations, Revision 0.

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Control of Occupational Exposure in Teletherapy Operations

Revision 1

1. Scope

This program applies to the control of occupational exposure and to all radiation monitoring and surveys conducted for the purposes of assessing occupational exposure within the jurisdiction of and pursuant to the requirements of 10CFR Part 20 as applied to Neutron Products' teletherapy field operations and activities licensed under NRC licenses 19-25203-01 and SUB-1551.

2. Policy

2.1 Neutron Products designs its systems and operations such that its employees' occupational exposure to ionizing radiation remains compliant with regulatory limits and is as low as reasonably achievable (ALARA), per Neutron's ALARA programs..

2.2 Neutron Products maintains an active program of monitoring and surveillance to assure compliance with applicable regulation and corporate policy.

3. Radiation Surveys

3.1 The radiation dose rates at the Ranson facility shall be surveyed no less often then every 6 months to develop a dose rate map demonstrating compliance with Section 9.6 of this program. In addition, surveys shall be conducted at any time the placement of the depleted uranium inventory at Ranson is modified in a way which could significantly alter radiation levels within the facility.

3.2 During teletherapy field operations routine radiation surveys shall be conducted in accordance with applicable written procedures so as to:

- Monitor and evaluate radiation levels within the workspace;
- Safeguard against accidental exposure to radiation in excess of regulatory limits or significantly greater than expected;
- Monitor the transfer of sources;
- Evaluate radiation dose rates from loaded teletherapy equipment and transfer casks; and
- Establish compliance with applicable regulations for the transport of radioactive material.

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3.3 Portable gamma radiation survey meters for monitoring of radiation dose rates and for conducting radiation surveys shall be readily available and maintained in usable condition. Instruments shall be specified such that range, precision, time constant and other aspects are appropriate for the accurate determination of dose rates being measured.

3.4 For surveys conducted during field operations involving the removal of significant shielding or otherwise with potential for high radiation levels, the survey meter shall be specified such that:

- the maximum is no less than 500 R/hr,
- the detector can be placed at appropriate measurement locations without interference with the installer's movements,
- a user-adjustable audible dose rate alarm is provided, and
- the instrument does not falsely indicate a low or zero dose rate upon saturation of the detector.

4. Personnel Dosimetry for External Occupational Exposure

4.1 Personnel dosimetry is not required for routine operations at the Ranson facility, provided that the provisions of Section 9.6 are maintained.[1]

4.2 Teletherapy personnel shall be monitored during field operations in accordance with written procedures such that:

a) Whole body exposure (WBE) is monitored at the center of the chest by two dosimeters (monthly and quarterly) and an electronic self reading dosimeter (SRD) with an audible alarm set at 300 mrem; and

b) Upper extremity exposure is monitored by four ring dosimeters worn on the thumb and index fingers of each hand and by SRDs (electronic or quartz tube) worn at the wrist.

4.3 Dosimeters (other than SRDs) shall be obtained from and analyzed by an approved vendor, certified by the National Institute for Standards and Technology under NVLAP for gamma and beta radiation dosimetry, and shall be

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[1] Personnel dosimetry is required for any employee entering the Restricted Area at Dickerson including employees usually assigned to Ranson.

either thermoluminescent dosimeters (TLD) or optically stimulated luminescent dosimeters (OSL).[2]

4.4 The dosimetry vendor shall be instructed to notify Neutron by telephone or fax when any dosimeter measures more than 500 mrem.

4.5 Lost or forgotten dosimeters shall be replaced promptly with spare dosimeters.

4.6 Self-reading dosimeters shall be monitored in accordance with written procedure. SRD doses for each job shall be recorded on the Teletherapy Health Physics Form.

4.7 In the event that an SRD goes off scale (except when it is certain that the cause was the dropping of the dosimeter), or indicates a possible overexposure the dosimeter badges for the effected employee shall be shipped by overnight service to the processor for expedited processing.

5. Internal Exposure

5.1 Operations falling within the scope of this program involve sealed sources only. Routine monitoring of internal exposure is not required.

5.2 In the unlikely event of failure of a source encapsulation with potential for internal exposure by inhalation or ingestion, the RSO shall direct appropriate measures to determine the committed effective dose equivalent (CEDE).

6. Calibration of Equipment

6.1 Unless otherwise specified, survey instruments shall be calibrated no less often than every twelve months and at such other times deemed appropriate, in accordance with a documented procedure established and maintained for that purpose.

6.2 The calibrations of quartz-tube SRDs shall be verified semiannually and those of electronic SRDs verified annually. All dosimeters with correction factors outside the limits of 0.8 to 1.2 mrem or with leakages in excess of 10 % of full scale per week shall be removed from employee monitoring service.

6.3 Calibration standards shall be traceable to NIST or an equivalent national standards setting body.

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[2] The dosimetry account may be combined with that used for Dickerson.

6.4 Calibration of personnel dosimeters other than SRDs is the responsibility of the dosimetry processor.

7. Oversight and Evaluation of Exposure

7.1 Upon receipt of a Teletherapy Health Physics Form, the RSO-Teletherapy shall review the SRD data and investigate any dosimetry results which vary significantly from those expected.

7.2 Upon receipt of monthly dosimetry results the RSO-Teletherapy or designee shall,

7.2.1 Reconcile spare dosimeter results for any effected employees.

7.2.2 Review the monthly exposures for all teletherapy personnel.

7.2.3 Identify all employees with monthly WBE above 500 mrem.

7.2.4 Track accumulated year-to-date exposures for all teletherapy employees.

7.2.5 Identify any problems or inconsistencies with the monthly report.

7.2.6 Compare results to Teletherapy Health Physics Forms for the same period and investigate any significant inconsistencies.

7.3 Upon receipt of quarterly dosimetry results the RSO-Teletherapy shall:

7.3.1 Compare quarterly dosimetry results with the monthly dosimetry results and exposures obtained from SRDs for the period.

7.3.2 Identify any differences between the three records greater than the larger of 20% or 200 mrem.

7.4 The Radiation Safety Officer -Teletherapy shall:

7.4.1 Remain cognizant of year-to date whole body and extremity exposures for employees involved in the transport, installation, and removal of teletherapy sources and the servicing of teletherapy units.

7.4.2 Ascertain the year-to date whole body and extremity exposures for contractors involved in the transport, installation, and removal of teletherapy sources and the servicing of teletherapy units prior to scheduling them for any teletherapy operation.

7.4.3 Prepare an annual analysis of teletherapy employees and contractors.

7.4.4 Maintain a historical database of exposures by teletherapy machine manufacturer and model and type of operation.

7.5 In addition to the requirements of Section 4, each teletherapy employee should:

7.5.1 Be alert to the radiation dose rate in any area in which he is working.

7.5.2 Review the monthly dosimetry reports and stay cognizant of his accumulated year-to-date exposure.

7.5.3 Read and record his SRDs in accordance with applicable written procedures and stay aware of accumulated exposure during any operation.

8. Exposure of Record

8.1 In the event that an employee's monthly Dosimeter is irretrievably lost or destroyed, so that the employee's exposure over some period of time was unmeasured by monthly dosimetry, the RSO in consultation with the employee shall establish an administrative dose correction. The calculation of which shall normally include analysis of the individual's quarterly dosimeter and SRD data, work assignments and habits, and survey data. The dosimetry processor shall be notified, in writing, of the dose to be added to the employee's exposure history, and copies of the notification and the evaluation shall be given to the employee and filed in their exposure file.

8.2 The monthly dosimetry results, after adjustment for spare badges and administrative corrections pursuant to 8.1, shall be considered the exposure of record to be reported to employees in accordance with 10CFR 19.13 and 20.2106, except where there exists valid and compelling evidence that the monthly dosimetry result is erroneous based upon comparison with quarterly dosimeters, SRDs, survey results, and other available information. In such a case, the RSO in consultation with the employee shall establish the best estimate of the employee's exposure based on available data. The dosimetry processor shall be notified of the correction to be made to the employee's exposure history, and copies of the notification and the evaluation shall be given to the employee and filed in their exposure file.

9. Control of Exposure

9.1 All routine and non-routine operations involving occupational exposure to ionizing radiation shall be conducted in a manner which is compliant with applicable regulation, corporate policy, and this program.

9.2 Teletherapy operations shall be planned and conducted to be consistent with this program and the ALARA Program for Teletherapy Operations.

9.3 All teletherapy workers shall be effectively trained in accordance with written procedures in safe operating procedures and methods for maintaining exposures ALARA.

9.4 No teletherapy employee or contractor with an accumulated year-to-date whole body exposure above 3 rem or extremity exposure above 30 rem shall be assigned to a source transfer operation without the express permission of the RSO-Teletherapy in consultation with the Radiation Safety Committee giving consideration to:

- The expected exposures from the operation,
- The potential for higher than expected exposures,
- The availability of alternate personnel or scheduling, and
- Any effect on collective exposure from alternatives.

9.5 No teletherapy employee or contractor with an accumulated year-to-date whole body exposure above 4 rem or extremity exposure above 40 rem shall be assigned to a source transfer operation.[3]

9.6 Depleted uranium shall be stored at Ranson in such a manner that no occupied portion of the plant can receive an exposure rate in excess of 2 mrem in any one hour and that personnel assigned full-time to Ranson will not receive an occupational exposure while there in excess of 50 mrem/year.

9.7 The RSO has the authority to stop any operation which he considers unsound from a radiation safety standpoint.

10. RECORDS

10.1 The following records shall be maintained pursuant to this program and 10CFR 20.2106, until termination of all licensed activities

- Records of radiation surveys made for the purpose of determining exposure,

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[3] That is, present in the teletherapy room during a source transfer.

- Teletherapy Health Physics forms,
- Dosimetry reports,
- Calibration records
- Records of analyses, investigations, dose corrections, etc.,
- Written declarations of pregnancy, and
- Records of prior occupational dose in accordance with 10CFR 20.2104.

10.2 These records shall be maintained in such a way that they are protected from damage, deterioration, or loss and are available for review, audit, or inspection.

PROCEDURES FOR SOURCE TRANSFER, MAINTENANCE, AND SERVICE ASSOCIATED WITH TELETHERAPY DEVICES

P-9

REVISION 5

Effective Date: September 9, 2010

Reviewed for Adequacy for Intended Purpose, and Approved

Jerry L. Fogle — 9-9-10
Lead Source Handler — Date

Reviewed for Compliance and Safety, and Approved

Edmond J. DeRosa, RSO — 9-9-10
19-25203-01 / SUB-1551 — Date

Principle author: W.L. Ransohoff

Change record: This replaces Revision 4

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PROCEDURES FOR SOURCE TRANSFER, MAINTENANCE,
AND SERVICE ASSOCIATED WITH TELETHERAPY DEVICES

Neutron P-9

Revision 5

I. PURPOSE

This procedure addresses source shipment, source transfer, and the maintenance and service of teletherapy devices containing sealed teletherapy sources.

II. ADMINISTRATIVE RESPONSIBILITY

The radiation safety officer for teletherapy operations ("RSO-T") shall have overall responsibility for radiological and general safety of these operations.[1]

The lead teletherapy source handler at the site is the team leader for the job to be performed and has primary responsibility for the team's safety and for ensuring that the work is completed in accordance with applicable licenses, packaging authorizations and regulations.

Each other member of the team has the responsibility to bring any reservations about safety problems or lack of compliance with any applicable procedure or regulation to the attention of the team leader, and to call Neutron's RSO-T before proceeding further with the work if the concerns are not completely satisfied.

Bringing reservations to the team leader and/or Neutron's management will not be considered as a sign of disrespect by Neutron's management. Rather, failure to bring reservations to the team leader and/or Neutron's management will be considered as a shirking of duty to all concerned parties.

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[1] The RSO-T may delegate various individual tasks to other qualified individuals, but he retains overall responsibility for assuring operations are conducted safely and in accordance with this specification.

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III. RESPONSES TO NONROUTINE OCCURRENCES

In routine operations, whole body exposures generally do not exceed 100 mrem and extremity exposures generally do not exceed 1,500 mrem.

Exposure*	**Response**
Level A Events	
A - >100 mrem whole body to any member of the team. - > 1500 mrem, extremity to any member of the team.	A - Conduct survey. If survey results are abnormally high, post areas and limit access as necessary; and, - Determine and document cause of the exposure. Take action to prevent a recurrence, as applicable.
Level B Events	
B - > 500 mrem whole body to any member of the team; or, - > 3000 mrem, extremity to any member of the team; or - any problem of potential radiological significance which cannot be promptly resolved by or between members of the team; or, - > 50 mrem whole body to any non team member	B - Stop work; and - Conduct survey; post areas and limit access, as necessary; and, - Notify Neutron management as soon as practical; and, - Do not proceed without management approval; and, - Send TLD's to Neutron's dosimetry provider for an expedited read, as appropriate.
Level C Events	
C - >3500 mrem whole body to any member of the team; or, - >10 rem, extremity to any member of the team	C - In addition to the Level B responses, immediate notification of Neutron management is also required so that timely regulatory notifications can be made, as applicable.

* The numerical "exposures" above refer to either the actual number from a self-reading dosimeter, or a situation which, in the judgment of any team member, could have caused a whole body or extremity exposure higher than the numerical values specified above.

Level D Events

Level D events involve potential exposure to high or very high radiation levels and entail probable evacuation of the teletherapy room without opportunity for safe reentry. Accordingly, as provided for in section IV.4 of this specification, the team leader shall assure that, prior to beginning source transfer operations, a copy of this specification and a radiation survey instrument capable of conducting the survey described in step 4 below are maintained in an accessible location outside the teletherapy room.

The procedures, equipment and training elements of Neutron's teletherapy program are designed and intended to preclude a situation in which a teletherapy source is in an unshielded or inadequately shielded position, except for the brief period of time in which the source is traveling between the cask and the head.

An unplanned event in which a source is in an unshielded position would present a potential injurious situation and would require a rapid response from the teletherapy team which is duly protective of the team and members of the public. There would be no time to consult P-9 during the most critical period of such an event, so the team's response must be second nature. To the extent that the dose rate can be substantively reduced without endangering members of the team (i.e., source is near edge of cask, but can be slid back into center with shielded tool), then it should be done immediately.

When reviewing this section of P-9, team members are reminded of the potentially hazardous nature of their work and the severe consequences (loss of hands, other bodily injury, death) of excessive exposure to an unshielded source as well as the fact that their exposure increases exponentially as they get closer to the source. Under no circumstances should attempts be made to use one's hands to grab (even briefly) an exposed source. Doing so will result in, at a minimum, the certain loss of fingers. All of these considerations are used to focus the team on their response to such a situation, and also on their best defense - a focused approach on the job and adherence to procedural elements designed to prevent such an outcome.

In the unlikely event that a situation arises in which there is an exposed source which cannot be quickly and safely returned to a shielded position, the automatic response of the team must be to move away from the source and to quickly leave the room. These provisions should also be followed in the event of a catastrophe, such as an earthquake, fire, hazardous civil disobedience, etc. Subsequent steps include:

1. Post the teletherapy room door with a notice that no one should enter the room without the source handler's approval and only in the source handler's presence, and post the appropriate radiation level indication:

CAUTION RADIATION AREA for dose rates in excess of 5 mrem/hr;

CAUTION: HIGH RADIATION AREA or
DANGER: HIGH RADIATION AREA for dose rates in excess of 100 mrem/hr; or,

GRAVE DANGER: VERY HIGH RADIATION AREA for dose rates in excess of 500 rem/hr.

2. Lock or otherwise prevent the entrance of all the personnel to the source room.

3. Notify the host's RSO and any regulators on-site of the situation.

4. Work with the host's radiation protection personnel to survey the areas adjoining the teletherapy room and to develop a plan to address regulatory requirements, restricted access, appropriate postings and controls, etc.

5. Notify one of the following individuals to assist in the planning and evaluation of subsequent action:

Edmond J. DeRosa
Radiation Safety Officer, - 03 License

Jeffrey D. Williams
Radiation Safety Officer, - 01 License
Director of R& D

Jackson A Ransohoff
President

William L. Ransohoff
Plant Manager

Also, notify the medical physicist if on-site.

6. Do not reenter the teletherapy room until a corrective action plan has been proposed and approved by all cognizant authorities.

7. The individual notified in item 5, or, if they are not immediately available, the responsible licensed engineer should immediately notify the applicable US licensing authority by telephone of each event involving a source of radiation possessed by the

licensee or registrant that may have caused or threatens to cause any of the following conditions:

- dose to the whole body of any individual of 25 rems (0.25 Sv) or more; or,
- dose to the skin, feet, ankles, hands, forearms, of 250 rads (2.5Gy) or more.

IV. ADMINISTRATIVE PREPARATIONS

IV.1. In preparation for the job or shipment, the RSO-T shall:

- identify the source(s) which is(are) to be transferred to(from) the teletherapy unit;
- prepare the teletherapy document package for the proposed job;
- review installer history and confirm compliance with Neutron's Source Handler Training Program;
- determine, and confirm with the appropriate regulatory authority, that the licensee has the authority to possess the isotope, the material form (i.e., special or normal form), the physical form (normally solid), and the quantity for the proposed shipment;
- determine that the package approval, Certificate of Compliance or Certificate of Competent Authority is appropriate for the proposed shipment;
- satisfy the requirements of applicable NRC orders;
- determine proper pre-reporting, post reporting and other special procedures required by Neutron and cognizant regulatory agencies (e.g. Federal, state, and city);
- inquire if a wipe test has been performed by or for the facility in the previous six months and request a copy of the report; and,
- confirm that all source holders have passed a visual inspection and that any source holder that has any adjustable parts (e.g. Toshiba source drawers) have also been inspected and accepted in accordance with appropriate written procedures to minimize the probability of having to perform any adjustments in the field.

IV.2. In preparation for the job or shipment, the Division III Quality Assurance Manager for Radioactive Transportation or designee ("QAMRT") shall determine that the shipping document package has been prepared in accordance with applicable DOT and international (if applicable) regulation.

IV.3. In preparation for the job or shipment, the team leader shall:

- contact customer to discuss logistics of proposed job;

- complete the Teletherapy Job Checklist(s) which is appropriate for the job(s);
- obtain a copy of the applicable, approved Teletherapy Notice(s) or Service Report(s) from the RSO-T;
- complete the Radioactive Shipment Record(s);
- for new source installations, confirm that the document package contains a metal label which includes:

  a. the identity of the isotope, e.x. cobalt-60
  b. quantity of isotope in TBq and curies
  c. date of measurement
  d. Neutron's catalog number
  e. Neutron's model number (if applicable)
  f. Neutron's serial number
  g. "Caution - Radioactive Material" and the radiation symbol, if not elsewhere on the unit.

- review procedures, drawings and manuals, as necessary, and ensure that all team members have done the same.

IV.4. In continuation of job preparations, after arriving on-site, the team leader shall:

- determine from the host licensee:

  a. requirements for mechanical restrictions on the unit, if any; and,

  b. other limitations on the unit, if any.

- confirm the identity of the source which is to be transferred from the teletherapy unit.
- consult with host's radiation safety personnel to confirm that the room shielding and access controls are adequate for the planned operation.
- complete the Radioactive Shipment Receipt Checklist, as applicable.
- ensure that there is a copy of P-9 and a survey meter outside of the teletherapy room.

V. DOSIMETRY

V.1 Except as provided in V.2, all members of the team shall wear at least:

a. whole body dosimetry, in the center of the torso consisting of:

- two TLD personnel dosimeters; and,
- an electronic SRD capable of measuring at least 1000R; and,

b. extremity dosimeters consisting of:

- a TLD personnel dosimeter on the thumb, and index finger, of each hand, with the ring worn so that the dosimeter is on the back side of the finger; and,
- an SRD or electronic dosimeter capable of measuring at least 10 R on each wrist.

V.2 Dosimetry on the extremities is not required when performing service while:

- the source is in the "off" position; and,
- no shielding is removed from the unit (excluding the collimator).

V.3 Each team member is responsible for confirming that his electronic dosimeter's audible alerts and alarms are set for:

- 10 mR increments (alert); and,
- an integrated incremental dose of 300 mR (alarm).

V.4 Each team member shall confirm that all of his SRDs have been zeroed before starting the job.

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VI. SURVEY METERS

VI.1 For jobs in which a source transfer is to take place, survey meter requirements include:

- a high range survey instrument with a maximum reading of at least 500 R/hr. This meter should have a fast response and, in the event of extremely high dose rates (up to 15,000 R/hr.) it should not give a false low reading, but should instead either read "off-scale" or equivalent (if it is a digital meter), or should have the needle pegged (if it is an analog meter);

NOTE: Because the high range survey meter is configured to be accurate at high dose rates, it may not be accurate at low dose rates and may not, therefore, be appropriate for routine surveying, such as surveying the head or measuring the TI of a package prior to shipment.

- a survey meter capable of reading in the range of 1 mR/hr. to at least 1 R/hr without saturating. This meter shall be used for routine surveys, but is not intended to be used for surveys conducted during source transfer operations; and,

- an instrument capable of detecting 185 Bq of cobalt (0.005 microcuries) or less on a wipe (normally an Eberline E120 or equivalent).

VI.2 For jobs in which no source transfer is to take place, the high range survey instrument and the E-120 (or equivalent) described above are not required.

VI.3 The team leader shall confirm that the correct instruments are available and that the survey meters are operable and within their calibration due dates.

VI.4 If it cannot be confirmed that all of the specified radiation meters are available, call the RSO-T, and do not proceed without explicit approval.

VII. STARTING THE JOB

The lead installer or designee shall:

VII.1 Take and maintain possession of the keys which are required to turn the unit to the "on" position.

VII.2 Confirm that the source is in the "OFF" position by:

- observing the control panel and the in-room radiation monitor; and,

- making a check survey of the teletherapy unit head leakage.

VII.3 Post the control panel with a sign indicating that the unit should not be turned on because the unit is being serviced.

VII.4 Post the room door with a sign indicating that no-one should enter the room because the unit is being serviced.

VII.5 Exclude all personnel except members of the team from the teletherapy room.

VII.6 Determine the operability of the unit, taking all precautions to minimize dose to personnel; e.g., define beams, and utilize teletherapy unit head and cask for shielding.

VII.7 Wipe test the accessible parts of the unit which are most likely to be contaminated in the event of a leaking source with a meter sufficiently sensitive to detect 0.005 microcuries (an indication of a potentially leaking source) as determined by comparison with the measurement of a standard cobalt-60 source. If the test reveals presence of 0.005 microcuries or more of cobalt-60, take prompt action to limit spread of contamination, notify Neutron's and the host facility's RSO or designee, notify medical physicist if on-site and take appropriate action. Appropriate action will be determined with concurrence of all involved, including appropriate regulatory personnel. The decontamination procedure for AECL/Theratronics round drawer units, NR 2501, is given in Appendix G. The decontamination procedure for all other units will be developed by the source handler and the RSO-T on a case by case basis.

If the test reveals less than 0.005 microcuries of cobalt-60, proceed with the work in accordance with the appropriate Appendix for the unit.

VIII. SOURCE TRANSFER OPERATIONS

For additional details on Picker/ATC units, see Appendix II.
For additional details on AECL/Theratronics units, see Appendix III.
For additional details on Siemens Gammatron units, see Appendix VI.
For additional details on Detailed Removal and Installation Procedure for CIS /CGR Alcyon Teletherapy Units, see Appendix XI

IX. UNIT INSPECTION AND JOB CLOSE-OUT

The lead installer shall:

IX.1 Inspect unit per Table I, taking all reasonable precautions to minimize dose to personnel which are consistent with ALARA; e.g. define beams and utilize teletherapy unit head and cask for shielding.

IX.2 If the unit cannot be placed in safe operating condition, secure it in a safe position and notify host's RSO, Neutron's management and the appropriate regulatory personnel.

IX.3 When applicable, permanently attach the metal source tag(s) to the unit.

IX.4 Complete and submit to licensee, as applicable:

- Teletherapy Source Transfer form;
- Report of "Five Year Inspection" noting non-standard service performed and all parts replaced (both customer and Neutron supplied);
- Service report, noting non-standard service performed and all parts replaced (both customer and Neutron supplied).

IX.5 Ensure that all members of the team have read, recorded and initialed their own exposures on the Teletherapy Health Physics Report when all operations which do or could involve exposure to radiation from the unit, source, or shipping package have been completed.

X. SHIPPING

X.1 The lead installer or his designee responsible for the particular shipment shall:

- Ensure that the package is unimpaired, i.e., it has integrity of shielding and closure;
- Ensure that the package is loaded in accordance with established procedures;
- Affix tamper seals or other devices which would indicate an unauthorized opening;
- Measure, with an appropriate meter, and record the maximum radiation in SI and customary units accessible on the external surface of the package and at 1 meter (3.3 feet) from the package.
- For nonexclusive use shipments, confirm that the radiation dose rate does not exceed 2 mSv/hr (200 mR/hour) at any point on the external surface and the transport index does not exceed 10.
- For exclusive use shipments in a closed vehicle, confirm that the radiation dose rate does not exceed:

  - 10 mSv/hr (1000 mR/hour) at the surface of the package;
  - 2 mSv/hr (200 mR/hour) at any point on the outer surface or outer edge of the vehicle; (including the top and underside)
  - 0.1 mSv/hr (10 mR/hour) at any point 2 meters (6.6 feet) from the outer lateral surfaces or the outer edge of the vehicle (excluding the top and underside); and,
  - 0.02 mSv/hr (2 mR/hour) in cab or any normally occupied position in vehicle.

X.2 Wipe an area of 300 square centimeters (approximately 45 square inches) from several places on the exterior of each package where the highest contamination might be expected, and count or survey the smear to determine whether or not the removable surface contamination exceeds 2,200 dpm/100 square centimeters.

a. Proceed with the shipment if the average smear does not exceed 0.4 Bq/square centimeter beta-gamma (2200 dpm/100 square centimeters).

b. If these levels are exceeded, decontaminate the package.

c. If the package cannot be decontaminated in a reasonable period of time, call the RSO-T or designee.

d. Treat the smears and decontamination material as radioactive waste to be left with the host's RSO.

X.3 Affix two labels to opposite sides of the package for all packages of radioactive materials. These labels must be one of the following types:

Radioactive White - I if the external radiation level is less than 0.005 mSv/hr (0.5 mR/hour) at the surface of the package(i.e., the radiation level at 1 meter is less than 0.0005 mSv/hr (0.05 mR/hr)and when the radiation level at 1 meter is less than 0.0005 mSv/hr (0.05 mR/hr). There is no TI for a Radioactive White Label.

Radioactive Yellow - II if the external radiation level is greater than 0.005 mSv/hr (0.5 mR/hour) at the surface, but less than 0.5 mSv/hr (50 mR/hour) at the surface and a TI greater than 0 but not more than 1.0.

Radioactive Yellow - III if the external radiation level is greater than 0.5 mSv/hr (50 mR/hour) at the surface, but less than 2 mSv/hr (200 mR/hour), and for Special Arrangements and Exclusive Use Shipments.

Empty when the radioactive material has been emptied of contents as far as practical and the DOT requirements for an empty package have been met.

X.4 Placard vehicle in accordance with Appendix X, which is intended to comply with DOT regulations, International Maritime Dangerous Goods Code and International Civil Aviation Organizations.

XI. RECORDS

XI.1 The team leader or his designee shall give the complete, fully executed document package to the RSO-T.

XI.2 The RSO-T shall:

- Evaluate and document all whole body dosimetry over 100 mrem and extremity dosimetry over 500 mrem.
- Compare the exposures of each team member's SRDs on the Teletherapy Health Physics Report to the reported exposure on their monthly TLD.
- Evaluate and document all differences between the monthly TLDs and the SRDs which are greater than 200 mrem or 20%, whichever is larger.
- Review the complete Radioactive Shipment Receipt Checklist for each shipment.

CHANGE RECORD

Significant changes include:

- reorganization of the entire specification. This includes making the body of P-9 itself a stand-alone document. As the appendices are rewritten, their pages will be renumbered so that they too, will be stand-alone documents.
- Appendix I, Emergency Procedures, has been rewritten and incorporated into the body of P-9, so that there is no longer any Appendix I.
- Dosimetry requirements have been modified to require the use of ring badges, instead of allowing either wrist or ring badges to be used in order to monitor extremity exposures. In addition, dosimetry requirements now specify that TLD's and SRD's shall be worn together in the center of the torso, as opposed to allowing the SRD's to be worn in the shirt pocket.
- The radiation survey meter/monitor requirements have been changed to require the use of a higher range instrument than specified in Revision 3.
- The training requirements of Neutron's Source Handler Training Program have essentially been incorporated by reference, and a recitation of the specific requirements of that program has been removed from the body of P-9.
- Deletion of appendices IV, V, VII, VIII, and IX.
- Deletion of footnote 1 on cover page.
- Change effective date.

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NPI P-9
Revision 2

TABLE I
INSPECTION CHECKLIST

Operation		Prior To Transfer	Subsequent To Transfer
1.	Determine operating history	X	X
2.	Head movement	X	X
3.	Electrical and mechanical source condition	X	X
4.	Manual source/shutter return	X	X
5.	Timer	X	X
6.	Source holder/shutter movement check	X	X
7.	Pneumatic activating system	X	X
8.	Mercury shutter system	X	X
9.	Stand and stretcher		X
10.	Protective source housing, beam off leakage		X
11.	Source-surface distance (SSD)		X
12.	Beam orientation	X	X
13.	Congruence of light and radiation fields	X	X
14.	Full calibration	X	X
15.	Facility door interlock	X	X
16.	Teletherapy units with moving source drawer	X	X
17.	Teletherapy units with moving shutter blocks	X	X
18.	Teletherapy units with rotating shutter	X	X
19.	Indicator light	X	X
20.	Emergency shutoffs	X	X
21.	Collimator	X	X

*Circle all items not meeting attached criteria.

**Circle all items not meeting attached criteria after servicing.

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Inspection Criteria

1. History

Interview the operator or licensee regarding the unit's prior operating history and obtain available and applicable drawings and manuals.

2. Head Movement

The head movement and rotation shall be smooth and free. The equipment shall be stable in any position in which it can be used. The mechanical or electrical stops shall work satisfactorily and hold the equipment firmly in position.

3. Electrical and Mechanical Source Position Indicator Check

The electrical and/or mechanical source position indicators shall accurately reflect the "on-off" condition or position of the radioactive source.

4. Manual Source/Shutter Return

The proper operation of the manual source or shutter return mechanism and accessory equipment shall be confirmed.

5. Timer

The timer shall be operative and terminate the exposure after a preset time. The accuracy and reproducibility of the timing mechanism shall be checked after the installation.

6. Source Holder/Shutter Assembly

The time and ease of movement of the source holder/shutter mechanism (as determined by audible or visible signals and stopwatch timing) shall be within the specifications given by the machine manufacturer.

7. Pneumatic Activating System

a. Leakage of pneumatic activating system shall be within manufacturer's recommended limits.

b. Reservoirs shall be free of accumulated moisture, as determined, either before or after transfer.

c. Individual line and overall system pressures shall be in accordance with manufacturer's

recommendations after installation.

8. Mercury Shutter System

In addition to inspecting the pneumatic system, all mercury seals shall be inspected for leakage.

The mercury seals shall be inspected when there is no source in the unit, unless the design of the unit permits inspection of the seals while the source is in the unit without exposing the inspector to a significant dose and, further, unless appropriate steps have been taken to prevent movement of the mercury shield.

9. Stand and Stretcher

The equipment shall be stable in any position in which it is to be used, and all indicator and movement systems shall function properly.

10. Protective Source Housing, Beam Off Leakage

The maximum and average radiation levels at one meter from the teletherapy source in the "off" position shall not exceed ten milliroentgens per hour (averaged over 100 square centimeters) and 2 milliroentgens per hour, respectively.

11. Source-Surface Distance (SSD)

The SSD defining device should enable the user to determine and reproduce a given source-to-surface distance to within ± 3 mm, over the range of treatment distances to be used.

12. Beam Orientation

Electrical or mechanical stops shall limit the direction of the primary beam, as specified in the host license.

13. Congruence of Light and Radiation Fields

The light field and the 50% penumbra line of the radiation field shall coincide at the distance set by the therapist or medical physicist to within 3 mm on any side in a 10 by 10 centimeter field.

14. Spot Check and Full Calibration Measurement

The radiation output of the machine shall be measured by the host's medical physicist.

15. Facility Door Interlock

The electrical interlock on the entrance door to the teletherapy room shall cause the radiation beam control mechanism to automatically return to the "off" position when the door is opened. The machine control mechanism shall require manual reactivation from the control panel before permitting return of the source to the "on" position.

16. Teletherapy Units with Moving Source Drawer

The source drawer bearings shall normally be inspected subsequent to the removal of the source drawer from the unit and prior to their reinstallation.

The source drawer bearings shall not show signs of excessive wear.

17. Teletherapy Units with Moving Shutter Blocks

The shutter blocks and tracks in which the blocks slide shall be examined for buildup of hardened lubricants, grooves or scratches and for the presence of foreign particles.

Depending on the design of the specific unit, the shutter blocks shall normally be cleaned and, if recommended by the manufacturer, lightly oiled while there is no source in the unit.

18. Teletherapy Units with Rotating Shutter

If applicable, the shutter wheel bearings, bushings, drive springs, belts, chains, gears, clutches, and/or pulleys shall function properly.

19. Indicator Lights

All indicator lights shall function properly.

20. Emergency Shutoffs

The emergency shutoffs shall function properly.

21. Collimator

The collimator shall operate smoothly.

REFERENCES

1. Conversions

   1 Bq (Becquerel) = 1 disintegration per second
   1000 curies = 37 TBq (Terabequerels or 10^{12} Becquerel)

   100 mR equal 1 mSv (1 milliSievert)

2. Transport Index - Dimensionless number (rounded up to the first decimal place, i.e., tenths) equivalent to the maximum radiation level in mR/hour at 1 meter (3.3 feet) from the external surface of the package. (Example: Maximum dose rate at 1 m = 4.33 mrem/hr. Then, TI = 4.4).

CALIBRATION OF RADIATION SURVEY METERS AND AREA MONITORS

PROCEDURE R 1007

Revision 6

December 26, 2000

Reviewed for Compliance and Safety, and Approved

Jeffrey Williams
Radiation Safety Officer, Facility

Dec 26, 2000
Date

Reviewed for Adequacy for Intended Purpose, and Approved

Jeffrey Corun
Manager, Limited Access Area

12-26-00
Date

Principal Author: J. Williams

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CALIBRATION OF RADIATION SURVEY METERS AND AREA MONITORS

PROCEDURE R 1007

Revision 6

1. Scope

This procedure covers the calibration of radiation survey meters and area monitors used in licensed activities by Neutron Products.

2. Precautions

2.1 Use of unshielded point source calibration standards, such as the M-498 cobalt-60 source, will result in exposure to the hand and whole body. Exposure should be minimized by decreasing time of exposure, increasing distance from source, and use of shielding where practical. Whenever possible, the source should be placed at a fixed position and the instrument/detector moved towards it. Such sources should never be handled directly with the hands.

2.2 When using collimated calibration standards, such as the "Navy source", proper precautions should be taken to ensure that no person will be exposed to the beam at a dose rate in excess of 5 mrem/hr. Use shielding, barricades, and/or other appropriate measures. Under no circumstances should the unshielded calibration source be left unattended.

3. Considerations

3.1 Calibration standards whenever possible should be traceable to the National Institute for Standards and Technology (NIST) or other nationally recognized standards setting body. If use of a non-traceable calibration standard is necessary, the justification for its use should be documented.

3.2 A master list of radiation survey and monitoring instruments shall be established and maintained.

3.3 New instruments which have been "factory calibrated" may be used for up to twelve months from their calibration date, provided that the calibration source is compatible with the instrument's intended application and suitable calibration labeling and/or certification is provided.

3.4 In lieu of this procedure, any instrument may be calibrated by a qualified outside vendor provided that the calibration source is compatible with the instrument's

intended application and suitable calibration labeling and/or certification is provided.

4. Personnel

This is a routine procedure that can be performed by a qualified technician under Radiation Work Permit 01.

5. Frequency

5.1 All survey meters and radiation meters shall be calibrated no less often than every twelve months.

5.2 Radiation area monitors associated with irradiators shall be calibrated during quarterly maintenance.

5.3 Any instrument found to be out of calibration by more than 20% on any scale shall be re-calibrated on a quarterly schedule or removed from service.

5.4 Any or all instruments may be calibrated on a more frequent schedule at the discretion of a radiation safety officer, the LAA manager, or the instrument user.

6. Preparations

6.1 Prepare decay corrected dose rate chart for the calibration source used. (Generally, a computerized program or spreadsheet is available for this purpose.)

6.2 Review instrument operating manual for specific calibration instructions.

6.3 Perform battery check and any other instrument specific test functions and/or electronic adjustments as specified in the operating manual.

6.4 Instruments with a "background subtract" or "artificial background" should have that feature disabled before proceeding with the calibration.

6.5 Take appropriate safeguards (e.g., shielding, barricades, communication) to assure that personnel not active in the calibration will not be exposed to fields in excess of 5 mrem hour.

7. Dose Rate Measurement

7.1 With point source (e.g. M-498) on instruments with portable detectors.

7.1.1 Remove source from shielded container and place it at end of tape measure.

7.1.2 Place detector at fixed distance from source at a known dose rate. Read and record final dose rate measurement. Repeat process at two dose rates for each scale (multi-scale instruments) or decade (logarithmic or auto-scale instruments). For any point where background radiation constitutes more than five percent of the source dose rate the background shall be subtracted from the reading.

7.1.3 Return calibration source to shield.

7.2 With point source on fixed instruments

7.2.1 Place end of tape measure at the detector.

7.2.2 Place source at fixed distance and proceed as in 7.1.2-7.1.3.

7.3 With collimated beam source (e.g. "Navy" source)

7.3.1 Install instrument rack to front of cask.

7.3.2 Stand behind or beside the cask.

7.3.3 Unlock and remove shield plug from cask.

7.3.4 Place detector at the appropriate mark on the instrument rack.

7.3.5 Add absorbers as necessary to obtain a known dose rate. Read and record final dose rate measurement. Repeat process at two dose rates for each scale (multi-scale instruments) or decade (logarithmic or auto-scale instruments). For any point where background radiation constitutes more than five percent of the source dose rate the background shall be subtracted from the reading.

7.3.6 Remove all absorbers when instruments are calibrated.

7.3.7 Replace and lock shield plug.

8. Calibration of CPM instruments (e.g. Ludlum 177) using the Ludlum Model 500 Pulser

8.1 Ludlum instruments used in the counts per minute mode, e.g., Model 177s with G-M pancake probes, shall be calibrated using the Model 500 Pulser or equivalent in accordance with manufacturers instructions.

8.2 Instruments shall be checked at two count rates per range or decade, the actual and measured values shall be recorded.

9. Adjustment of instruments

9.1 All instruments shall be adjusted to be within 10% of the actual dose or count rate at each point on the scale that is tested.

9.2 Any instrument that can not be successfully calibrated shall be removed from service and appropriately marked.

10. Labels and Records

10.1 Each instrument shall have a calibration sticker attached to it giving the date of calibration, the initials of the technician performing the calibration, and the date when the instrument is due for its next calibration.

10.2 Where calibration is not performed at one or more scales or decades the instrument shall be labeled with a warning that it is not calibrated at that particular range.

10.3 For each calibration a record shall be maintained including the following:

- date of calibration
- name of technician performing the calibration
- NPI RSM or RAM number
- manufacturer
- model number
- serial number
- for each calibration point; the exposed dose rate, range of scale, and final reading
- results of additional checks or test functions
- any additional observations

RECEIPT AND STORAGE OF DEPLETED URANIUM AND TELETHERAPY UNITS

PROCEDURE R 2503

REVISION 1

EFFECTIVE DATE: October 21, 2003

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

Jeffrey D. Williams
QA Manager, Division III

Date Oct 21 2003

Edmond J. DeRosa
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Date 10-21-03

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RSO, SUB-1551 NRC License

Date 10-21-03

Author: Jerry L. Fogle

Change Record: This document supersedes Revision 0

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RECEIPT AND STORAGE OF DEPLETED URANIUM AND TELETHERAPY UNITS

PROCEDURE R 2503

REVISION 1

1. PURPOSE

The objective of this document is to define the system for receiving, storage and shipping depleted uranium contained in various parts of certain teletherapy units, and other teletherapy units and components which are removed from medical facilities in the field.

2. SCOPE

This procedure applies to all depleted uranium received, stored or shipped at the teletherapy remanufacturing facility.

3. DEFINITIONS

For the purpose of this document, the following definitions and abbreviations apply:

DU Depleted Uranium
RSO Radiation Safety Officer, SUB-1551 NRC License, unless otherwise specified
Teletherapy RSO Radiation Safety Officer for State of Maryland License, MD-31-025-03
Facility RSO Radiation Safety Officer for State of Maryland License MD-31-025-01

4. REFERENCES

There are no references for this procedure.

5. PERSONNEL

The following shall have the appropriate qualifications, training, experience and aptitude to perform their assigned responsibilities:

5.1 RSO is responsible for:

- all transactions involving receipt, storage and shipping of DU;
- quarterly inventory reports of DU transactions and quantities;
- Depleted Uranium Quantities list, See Attachment A
- annual physical inventory of all DU stored;
- maintaining records of all DU transactions; and,

- designating qualified personnel to perform these activities in his absence.

6. SAFETY

Adherence to all safety rules and guidelines is required. All personnel that deliver, receive, store and ship items containing DU at the teletherapy remanufacturing facility shall utilize personal protective equipment as specified for that facility in the Workplace Hazard Assessment for the location.

7. PROCEDURE

All teletherapy units shall be delivered to the teletherapy remanufacturing facility for storage, processing or disposal and shall be considered to contain DU, unless otherwise identified by the RSO. The RSO, or his designee, shall perform the following:

7.1 Determine which parts, if any, contain DU.

7.2 For each teletherapy head containing DU, assign a DU number for identification and inventory purposes. Mark on the teletherapy head or tag/label attached to the head the DU number assigned. Record the date, project number if known, part type or model and serial number of the unit, DU number assigned, origin of the DU, amount of DU contained, total DU in inventory, and initials in the DU inventory logbook. In addition, add the part/unit to the Teletherapy Unit Inventory logbook and inventory list. Store the head and other unit components in an appropriate location in the facility.

7.3 For each collimator containing DU, add the collimator to the DU inventory logbook and list, including type of unit from which it was removed and the amount of DU that it contains. Store the collimator in an appropriate location in the facility.

7.4 For all other parts containing or made of DU, determine the type of the part and the amount of DU contained within. Add the part by quantity, type and amount of DU contained in the DU inventory logbook and inventory list. Store the part(s) in an appropriate location in the facility.

7.5 If the parts containing DU were shipped from the Dickerson, Maryland facility, notify the Teletherapy RSO at Dickerson that the DU has been received and verify that the Teletherapy

RSO at Dickerson has removed the DU from the Dickerson DU inventory.

7.6 For all items received that contain DU, verify that the DU inventory logbook and list totals are the same amount after the items are added to both.

Parts and teletherapy units containing DU are routinely shipped from the teletherapy remanufacturing facility. The RSO, or his designee, shall perform the following:

7.7 As directed by sales staff, identify the parts/unit containing DU to be shipped from the facility.

7.8 Package the part/unit for shipment according to all applicable regulations.

7.9 When the part/unit has been physically removed from the facility (shipped), enter a transaction in the DU inventory logbook showing date, project number if known, part type or model and serial number of unit, DU number for heads, destination of the part/unit, amount of DU to be removed from inventory, total net inventory remaining at the facility, and initials of shipper. In addition, remove part/unit from the inventory list and subtract from the total the DU amount removed and shipped from the facility. Verify that the DU inventory logbook and inventory list totals are the same amount.

7.10 The RSO shall submit a quarterly report to the Teletherapy and Facility RSO's, and the records clerk at the Dickerson, Maryland facility, to include at least the following:

- total kilograms of DU received since the last report;
- total kilograms of DU removed (shipped) since the last report; and,
- the total amount of DU in kilograms in storage at the teletherapy remanufacturing facility as of the report date.

8. SECURITY

The teletherapy remanufacturing facility shall be kept locked at all times when Neutron Products personnel are not present. The key shall be controlled by the RSO and copies shall only be assigned to designees by the RSO. Non-employees shall be escorted by Neutron Products' personnel at all times when inside the teletherapy remanufacturing facility.

9. CONTAMINATION CONTROL

9.1 The RSO shall survey the teletherapy remanufacturing facility at least semiannually with a Geiger-Meuller tube survey meter. Results of the survey shall be documented and filed by the RSO, and copies sent to the Teletherapy and Facility RSO's, and records clerk at the Dickerson, Maryland facility.

9.2 The RSO shall perform, at least semiannually, wipe tests on some parts which were previously in contact with or adjoining the cobalt-60 source in units or parts received since the last wipe test, and on random places throughout the facility (including floor). The wipes shall be 300 cm square and shall be counted at the Dickerson, Maryland facility using the standard operating procedure. The RSO shall document and file the results of the wipe tests, and send copies to the Teletherapy and Facility RSO's, and the records clerk at the Dickerson, Maryland facility. If greater than 0.005 microcuries of cobalt-60 is found, the contamination shall be removed under the direction of the RSO.

10. RECORDS

The RSO shall file and retain the following:

- DU inventory logbook;
- DU inventory list;
- Results of surveys of the remanufacturing facility;
- Results of wipe tests performed at the remanufacturing facility; and
- Calibration records for the survey meter used at the remanufacturing facility.

All records shall be maintained until the license is terminated.

11. CHANGE RECORD

This is the first revision, major changes include:

- Position of MDU (Manager, Depleted Uranium) eliminated, replaced by onsite RSO

12. ATTACHMENTS

A. Depleted Uranium Quantities list, latest revision

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Attachment A - Depleted Uranium Quantities

Manufacturer	Model	Kilograms of Depleted Uranium Head	Collimator	Total
A.E.C.L.	Theratron B/B2	-----	-----	0.0 A
	Theratron CII	-----	-----	0.0 A
	Theratron F	-----	-----	0.0 A
	Theratron Jr.	-----	-----	0.0 A
	Theratron 60/EL-6	0.0	11.3	11.3 B
	Theratron 80/EL-8	19.4	17.0	36.4 B
	Theratron 765/EL-76	84.4	16.1	100.5 B
	Theratron 780 (s/n up to 143)	91.6	16.1	107.7 B
	Theratron 780/El-78 (s/n 144 and above)	90.7	22.5	113.2 B
	Theratron 780C	90.7	22.5	113.2 B
	Phoenix	90.7	22.5	113.2 B
	Theratron 1000			B
	Eldorado G & Super G	-----	-----	0.0 A
Picker	6096A & B	-----	-----	0.0
	C1, C2, C3, V2, V3	-----	-----	0.0
	C4 and V4	6.5(wheel)	-----	6.5
	C5	-----	-----	0.0
	C8 (C8M80) and V8	22.7	0.0	22.7
Picker/ATC	C9 and V9	22.7	0.0	22.7
Picker	C10,000 and V10,000	-----	-----	0.0
	C12			145.0
	Cesium-137	-----	-----	0.0
CIS/CGR	Alcyon II	127.0	25.0	152.0
Keleket-Barnes	KB	-----	-----	0.0
Philips		149.8	31.9	181.7
Siemens	Gammatron III	45.5	32.7	78.2
	Gammatron S			159.1
TEM	Mobilitron 80	211.6	50.7	262.3 C
	Stabilitron			262.3 C
Toshiba	RCR -	-----	-----	0.0
Westinghouse	All models	-----	-----	0.0

Notes

A **Could have Square Drawer w/DU, add** 29.0

B **Could have Round Drawer w/DU, add** 12.7

C **TEM pencils for source capsule, add** 2.0

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