

Republic of the Philippines
PHILIPPINE NUCLEAR RESEARCH INSTITUTE
Department of Science and Technology
Address: Commonwealth Avenue Tel. No.: 97-60-11 to 15
Diliman, Quezon City Fax No. : 95-16-46

DNRS BULLETIN NO. 87-01 SAFETY OF RADIUM SOURCES

A. ADDRESSEES

All medical licensees.

B. PURPOSE

This bulletin is provided to remind licensees of the risks posed by radium sources and to reiterate regulatory requirements regarding safety in their continued use or storage and the transfer either to a licensee who is authorized to receive and possess them or to the Commission.

C. DESCRIPTION OF CIRCUMSTANCES

The naturally radioactive radium (Ra-226) has a long half-life of 1620 years. Its long half-life is an advantage in medical implants because dosimetry is constant and replacement sources are not required except when the encapsulation becomes damaged, however, it becomes a disadvantage when long term risks of unnecessary exposure to both the public and radiation workers are taken into consideration.

Radium sources may get lost through theft or negligence. Loss of sources through theft can occur when the shielded safe for storage is not properly secured; through negligence, when left in the patient on discharge from the hospital, when removed from the ward among the refuse, or when washed down the sink through the trap.

Damaged source encapsulation could contaminate medical personnel, storage area and wards; lost sources may end up in unauthorized possession or improper use.

Damaged radium (Ra-226) sources release from its encapsulation radon (Rn-222), a radioactive gas. The radon gas decays to form a series of solid radioactive products which float in the air until these settle on surfaces. Thus, release of radon gas into the room could result in both inhalation and external exposure hazards.

D. REGULATORY REQUIREMENTS

1. Periodic Physical Inventory

Each licensee shall conduct a quarterly physical inventory to account for all sealed sources and devices received and possessed.

Opportunities for loss of radium sources are many in a busy hospital/clinic. From the time they are removed from the storage/safe, administered to the patient, and returned to storage/safe, they may pass through a number of hands. It is necessary therefore to devise a system for the transfer of sources such that a specific person is always responsible for its custody, and recording of receipt and return being made.

In spite of the greatest care, however, radium sources may be accidentally lost by, for instance, removal from the ward among the refuse, washing down the sink to become lodged in the trap beneath, or inadvertently left in the patient on discharge from the hospital. To prevent such loss, monitoring of the refuse from the wards, the sink trap, and outgoing patients must be performed.

In any case, quarterly physical inventory of sources will reveal any losses. The shorter the interval between the time at which a source is lost and the time at which the loss is discovered and reported the greater are the chances of recovery.

2. Leak Testing

Each licensee shall cause each sealed source or device containing more than 0.37 mBq (10 μ Ci) of radium to be tested for contamination and/or leakage prior to its first use and thereafter at intervals not to exceed six months. If the test reveals the presence of 185 Bq (0.005 μ Ci) of removable contamination, the licensee shall immediately withdraw the source or device from use and cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations.

PAEC inspections revealed that leak tests have not been regularly performed by licensees of radium sources and that in many cases, no tests have been carried out at all.

Radium sources which are in constant use should be examined periodically in order to ensure that no serious physical damage has resulted. Although the encapsulating materials are not readily corroded, needles may be seriously bent and thin-walled plaques may get scratched or dented. Plaques should be carefully handled at all times to prevent damage. The longer and thinner the needles, the greater is the risk of damage.

Licensee may perform the leak test by itself or through another competent organization. A radium needle, tube, or plaque may be tested for leakage by measuring its gamma activity. An appreciable decrease in its activity from the nominal value is an indication of leakage since it means that radon is escaping from the capsule and true equilibrium between radium and its decay products is not being maintained. Another method consists in placing the source to be tested in an air-tight glass vessel with a pellet of activated charcoal to

collect the escaping radon. After several hours, the charcoal is removed and tested, e.g., by means of thin-window G.M. tube.

Leaking radium sources must be withdrawn from use and hermetically sealed in a thick-walled glass tube. Repair of damaged radium sources cannot yet be done locally; anyway, sources which have been repaired are more likely to be damaged again since the repairs rarely restore the original mechanical strength.

E. TRANSFER OF SOURCES

Except as otherwise provided in his license, no licensee may transfer radioactive material to anyone other than to the Commission, or to any person authorized to receive such radioactive material by a valid license issued by the Commission.

Before transferring radioactive material to a person licensed by the Commission, the licensee transferring the material shall verify that the transferee's license is valid, unexpired and authorizes receipt of the type, form and quantity of radioactive material to be transferred. Verification may be done by checking a copy of that license, or through a written certification by the transferee to that effect with the license number and expiration date.

Within ten (10) days after each transfer of radioactive material, the licensee who made the transfer shall submit a report to the Commission showing his name, address, and license number, the type, form and quantity of radioactive material transferred, the date transferred, and the name, address and license number of the person to whom the material was transferred.

F. REQUIRED LICENSEE ACTIONS

In response to this bulletin, licensees shall:

1. Conduct a physical inventory to account for all radium sources received and possessed, and submit to the Commission a copy of the inventory report including explanations on the discrepancy between present and originally possessed sources. Henceforth, licensees shall conduct quarterly physical inventory to account for all sealed radium sources, the reports of which shall be submitted to the Commission upon request, or kept and made available during Commission inspection and audit.
2. Conduct, or cause to be conducted, leak tests on all radium sources, whether in continued use or in storage, to sort out damaged or leaking sources. A report on the result of the leak tests shall be submitted to the Commission, including plans for disposal of the damaged sources.
3. Inform the Commission on arrangements to transfer radium sources which will no longer be used either to a licensee who is authorized to receive and possess

them, or to the Commission for storage or disposal.

4. Devise a system to prevent loss of radium sources in continued use, i.e., during storage and movement from the safe to the patient and back. The procedure shall be submitted for review and form part of the licensee's commitment.

G. COMPLIANCE SCHEDULE

Licensee shall inform the Commission of the actions taken to comply with this bulletin within sixty (60) calendar days after receipt thereof.

September 23, 1987

CARLITO R. ALETA

Officer-In-Charge
Dept. of Nuclear
Regulations & Safeguards

Approved:

MANUEL R. EUGENIO

Commissioner

Technical Contact:

DOMINGO B. DOMONDON

Chief, Standards
Development Division
D N R S
Tel. 976011/15, Loc. 248