SSINS No.: 6835
IN 86-84

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

September 30, 1986

IE INFORMATION NOTICE NO. 86-84: RUPTURE OF A NOMINAL 40-MILLICURIE IODINE-125 BRACHYTHERAPY SEED CAUSING SIGNIFICANT SPREAD OF RADIOACTIVE CONTAMINATION

Addressees:

All NRC medical institution licensees.

Purpose:

This notice is to alert licensees of a spread of iodine-125 contamination resulting from the inadvertent cutting of the seed encapsulation during removal of the seed from Heyer-Schulte coaxial catheters. The seed was one of eight seeds used for brachytherapy treatment of a brain tumor. It is expected that licensees will review this information for applicability to their facilities and consider actions, if appropriate, to preclude similar problems from occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

The seeds, which are manufactured by 3M Company, are intended to be reusable because of the initial high activity of the seeds (40 millicuries per seed). Users of the seeds are motivated to reuse them for several patients because of the relatively high cost of the seeds. The seeds are removed from the old catheters and loaded into new catheters for implant into other patients. It was during removal of the seeds from the catheter that one of the seeds ruptured. The rupture was believed to have been caused by cutting the catheter to free the seeds with a sharp object, such as a razor blade or scissors. The licensee did not know that a seed had been ruptured. The seeds, including the ruptured seed, were reloaded into new catheters and implanted into a patient. As a result, the patient sustained a thyroid burden of about 557 microcuries and a radiation dose to the thyroid of about 2087 rads.

Licensee personnel were not immediately aware that one or more seeds had ruptured until they found iodine-125 contamination in a source/transport bucket stored in the brachytherapy source storage room (BSSR) on the day after the implant into a patient following reloading of the seeds into the new catheters.

The seeds were removed from the old catheters and loaded into new catheters in the BSSR an area not ventilated by a fume hood. Consequently, approximately 60 hospital personnel, including those involved in cleanup operations, received thyroid uptakes of iodine-125 from 0.04 to 209 nanocuries. A proper radiation survey meter was used, but the high background radiation in the BSSR masked the positive indication of contamination.

Discussion:

The isolated incident described is the only incident of its kind known by the NRC involving high-activity iodine-125 seeds. However, there have been several other similar incidents involving the use of low-activity seeds containing 0.1 to 1 millicuries used as permanent implants. Both types of seeds are manufactured by 3M Company.

The risk of iodine-125 seed rupture is relatively high when the seeds are used for several patients. The incident was caused because:

- the seeds are susceptible to damage from sharp tools such as razor blades or scissors
- the discolored or stained condition of the catheters after use in therapy makes viewing of the seeds difficult

The consequences of the seed rupture (involving patient exposures, other personnel iodine-125 uptakes, and facility contamination) can be mitigated by performing (1) adequate radiation surveys of the work area, using a radiation detection instrument capable of detecting the low-energy photons (average of 28 keV), (2) the proper handling of tools used to remove the seeds from the catheters, and (3) leak tests of the seeds. Also, contamination of the facilities probably can be prevented if the seed removal operation is performed in a fume hood. Personnel uptakes of the radioactive materials and facility contamination also might be mitigated by using radiation safety procedures designed to detect seed leakage promptly.

No specific action or written response is required by this notice. If you have any questions regarding this information notice, please contact the Regional Administrator of the appropriate NRC regional office or this office.

R. L. Spessard

James G. Partlow, Director for
Division of Inspection Programs
Office of Inspection and Enforcement

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Attachment: List of Recently Issued IE Information Notices

Attachment 1
IN 86-84
September 30, 1986

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-83	Underground Pathways Into Protected Areas, Vital Areas, Material Access Areas, And Controlled Access Areas	9/19/86	All power reactor facilities holding an OL or CP; fuel fabrication and processing facilities
86-82	Failures Of Scram Discharge Volume Vent And Drain Valves	9/16/86	All power reactor facilities holding an OL or CP
86-81	Broken Inner-External Closure Springs On Atwood & Morrill Main Steam Isolation Valves	9/15/86	All power reactor facilities holding an OL or CP
86-80	Unit Startup With Degraded High Pressure Safety Injection System	9/12/86	All power reactor facilities holding an OL or CP
86-79	Degradation Or Loss Of Charging Systems At PWR Nuclear Power Plants Using Swing-Pump Designs	9/2/86	All power reactor facilities holding an OL or CP
86-78	Scram Solenoid Pilot Valve (SSPV) Rebuild Kit Problems	9/2/86	All BWR facilities holding an OL or CP
86-77	Computer Program Error Report Handling	8/28/86	All power reactor facilities holding an OL or CP and nuclear fuel manufacturing facilities
86-76	Problems Noted In Control Room Emergency Ventilation Systems	8/28/86	All power reactor facilities holding an OL or CP
86-75	Incorrect Maintenance Procedure On Traversing Incore Probe Lines	8/21/86	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit