

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, D.C. 20555

December 7, 1989

NRC INFORMATION NOTICE NO. 89-82: RECENT SAFETY-RELATED INCIDENTS AT
LARGE IRRADIATORS

Addressees:

All U.S. Nuclear Regulatory Commission (NRC) licensees authorized to possess and use sealed sources at large irradiators.

Purpose:

This notice is intended to inform recipients of recent safety-related incidents at large irradiators and emphasizes the need for proper management actions and attention to preventive maintenance programs. This notice also serves to remind licensees of other safety-related incidents at irradiators covered in Information Notice 87-29. It is expected that licensees will review this information, distribute the notice to responsible radiation safety staff, and consider actions, if appropriate, to ensure both proper preventive maintenance programs and proper management actions to preclude similar situations from occurring at their facilities. However, suggestions contained in this notice do not constitute any new NRC requirements, and no written response is required.

Description of Circumstances:

A description of each of the following events is provided in Attachment 1. In summary, these events included:

- Deliberate bypass of the radiation monitor interlock system and another safety system designed to protect individuals from radiation-produced noxious gases.
- Significant contamination of pool water remaining unnoticed, which could have been detected sooner, had the pool water been continuously circulated and monitored through the demineralizer.
- An uncontrolled descent of a shipping cask into an irradiator pool, due to brake malfunction on a lifting crane.
- Leaks in the irradiator pool caused by localized caustic stress corrosion in pool liner welds.

Discussion:

Licensees are reminded of the importance of ensuring the safe performance of licensed activities in accordance with NRC regulations and the requirements of their licenses. Irradiators with high activity sealed sources are capable of delivering life-threatening exposures in a short period of time. Therefore, compliance with regulatory requirements and proper equipment maintenance is critical to safe operation.

Event Nos. 1, 2 and 3 on Attachment 1 illustrate a failure by management to assure that proper safety and maintenance procedures are followed. In June 1987, NRC brought to the attention of irradiator licensees other incidents that were caused by similar management practices. (See Attachment 2). Event No. 4 on Attachment 1 is included in this notice to remind licensees of the possibility of pool leakage, the need to investigate the causes of such occurrences, and their responsibility to take appropriate corrective action.

In view of the current and past incidents at irradiator facilities, it is strongly recommended that supervisory personnel be reminded of their responsibilities to evaluate potential safety hazards and assure safe operation at their facilities. The incidents described in Attachment 1 demonstrate the importance of:

1. Not bypassing interlock systems and other safety systems.
2. Adhering to regulatory requirements, license conditions and authorized operating procedures.
3. Continuously using demineralizers equipped with radiation monitors, or alternatively, frequently monitoring pool water conductivity and radioactivity concentration.
4. Properly maintaining equipment used with or incident to handling licensed materials.
5. Taking appropriate and effective action when operational abnormalities are observed.

Licensees are reminded that NRC must review and approve operating and emergency procedures prior to implementation at irradiator facilities. Licensees are also reminded that operating procedures approved by NRC during the licensing process are incorporated by reference into the license as requirements. Such operating procedures cannot be modified without prior approval. If you have developed alternate procedures that could be used temporarily to keep your facility operating during maintenance intervals, you must file an amendment with NRC regional offices, for review and approval, before such procedures can be used at your facility.

No written response is required by this information notice. If you have any questions about this matter, please contact the appropriate regional office or this office.



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Attachments:

1. Events That Occurred at Large Irradiator Facilities
2. Information Notice No. 87-29
3. List of Recently Issued NMSS Information Notices
4. List of Recently Issued NRC Information Notices

RECORD NOTE:

Event No. 1 occurred at Isomedix, Inc. (Docket Nos. 030-08985 and 030-19752) at their Parsippany, NJ and Northboro, MA plants in August 1987.

Event No. 2 occurred at Radiation Sterilizers, Inc. (State of GA licensee) at the Decatur, GA plant in June 1988.

Event No. 3 occurred at Radiation Sterilizers, Inc. (State of GA licensee) at the Decatur, GA plant in July 1989.

Event No. 4 occurred at the Defense Nuclear Agency's Armed Forces Radiobiology Research Institute (Docket No. 030-06931) in Bethesda, MD in April 1989.

EVENTS THAT OCCURRED AT LARGE IRRADIATOR FACILITIES

1. A licensee deliberately bypassed the radiation monitor interlock systems and substituted an administrative procedure for the engineered safeguard provided by the radiation monitor interlock. The substituted cell entry procedure was implemented without NRC review, approval and incorporation in the license. The alternate procedures did not constitute an entry control device that functioned automatically to prevent inadvertent entry and did not comply with the requirements of 10 CFR Subsection 20.203(c)(6)(i). In addition, the licensee installed jumper cables to bypass ventilation system interlock which were designed to automatically protect individuals from noxious gases produced as a result of irradiation.

Because of the extremely high radiation exposures that could result if interlock are not operational, NRC concluded this incident was a very serious violation of safety requirements. The licensee was not allowed to operate the irradiator until all safety systems were fully operational. This violation of NRC requirements, along with other safety-related violations, resulted in NRC proposing a substantial civil penalty.

2. Leaking cesium-137 source capsules contaminated pool water at Radiation Sterilizers, Inc.'s (RSI's) Decatur, GA plant and remained undetected for an extended period of time, because the licensee did not use the pool water monitoring system associated with the demineralizer. The contamination problem was finally discovered when the licensee took discrete samples and performed radiation surveys of the pool water, after activation of the radiation-level monitoring system, which had automatically locked the sources in the safe storage position, due to excessive radiation levels while the sources were in the stored position.

Failure to continuously use the demineralizer/pool-water monitoring system was contrary to the licensing Agency's understanding of the operations. Had the demineralizer been operated continuously, pool water contamination possibly could have been detected earlier and enabled the licensee to begin mitigating the contamination.

The facility has been shut down since June 1988. The U.S. Department of Energy (DOE), its contractors, and the State of Georgia are managing decontamination efforts at the site, which have been estimated to cost several million dollars so far. The DOE and RSI are also in the process of removing all the Waste Encapsulation Storage Facility sources from the RSI facilities at Decatur, Georgia and Westerville, Ohio and shipping them to DOE.

EVENTS THAT OCCURRED AT LARGE IRRADIATOR FACILITIES

(continued)

The State of Georgia and DOE are conducting investigations of other aspects and lessons learned as a result of this event. NRC has been periodically providing information in the NMSS Licensee Newsletter on the status of the DOE investigation into the cause of the source leakage. Licensees will be sent further information when it becomes available.

3. A contractor providing lifting crane services at a licensed facility was moving a shipping cask from the source storage pool to a mezzanine area, when the cask made an uncontrolled descent of approximately 19 feet. The cask stopped its descent approximately five feet below the surface, only after an operator activated a manual brake. No personnel were injured and there was no damage to, or contamination of, the licensee's facility or equipment as a result of this event. However, had the cask not been secured quickly, it could have damaged the radioactive sources in the pool or the pool itself.

This incident was a result of improper brake adjustment of the crane hoist. The crane brake was subsequently repaired and recertified for normal operations in accordance with current Occupational Safety and Health Administration regulations. Braking system inspection and adjustment, as well as functional load testing, are now established daily procedures before crane operation.

4. A licensee experienced a loss of pool water for several weeks that was approximately three times higher than expected from evaporative losses. The licensee performed tests to characterize the nature and quantity of the water loss and began daily assays of the pool water to determine compliance with release limits for unrestricted areas. Suspecting a leak in the irradiator pool, the licensee inspected the stainless steel liner and found localized caustic stress corrosion in many welds.

Apparently, welds made during construction of the facility in 1968 were not in accordance with industry standards. Thus, these faulty welds were subject to caustic stress corrosion which resulted in the recent pool water losses.

The facility has been shut down pending completion of repairs.