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

June 26, 1987

NRC INFORMATION NOTICE NO. 87-29: RECENT SAFETY-RELATED INCIDENTS AT LARGE IRRADIATORS

Addressees:

All NRC licensees authorized to possess and use sealed sources in large irradiators.

Purpose:

This notice is being issued to inform recipients of recent safety-related incidents at large irradiators, which could have been prevented by proper management actions and attention to preventative maintenance programs. It is suggested that recipients review this information and their procedures and consider actions, if appropriate, to ensure both proper preventative maintenance programs and proper management actions 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:

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

- hose failure resulting in a leak, failure to report the incident to NRC, and deliberate cover-up of this incident when NRC tried to investigate, leading to company fines and personnel probation;
- intentional bypass of safety interlocks, resulting in license suspension and other enforcement actions by NRC;
- improper pipe routing and inadequate piping material, which broke and caused partial loss of pool water;
- source unable to retract to its fully shielded position, due to a frozen solenoid valve;
- a stuck source plaque, due to failure to promptly replace a frayed lift cable; and
- a stuck source plaque, due to interference from the product carriers and shroud.

Discussion:

These incidents illustrate a failure by management to assure that proper safety and maintenance procedures are followed. It is suggested that supervisory personnel, particularly the Radiation Protection Officer and maintenance personnel, be reminded of their responsibilities to assure safe operation at their facilities. The incidents discussed in Attachment 1 demonstrate the importance of:

1. prompt reporting of incidents to the NRC, as required by regulations or license conditions

2. safety training and periodic retraining of personnel

3. not bypassing interlock systems or other safety systems

4. attention to proper plumbing installation and use of appropriate piping material

5. proper maintenance of cables, carrier systems, and other components that could prevent radioactive sources from being retracted to a shielded position.

No specific actions or written response is required by this Information Notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate NRC regional office or this office.

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Academic, and Commercial Use Safety
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Attachments:
1. Events That Occurred at Large Irradiator Facilities
2. List of Recently Issued NRC Information Notices

EVENTS THAT OCCURRED AT LARGE IRRADIATOR FACILITIES

1. While the licensee was attempting to decontaminate pool water because of a leaking source, a hose on a filtration system ruptured. Contaminated pool water was then pumped onto the facility floor and leaked outside into the surrounding soil. The licensee failed to report the incident to NRC, and made deliberate efforts to prevent NRC's discovery of this incident.

   Subsequently, the licensee was indicted by a Federal Court. A conviction resulted in a $35,000 fine for the company and two years probation for a management employee. Licensee failure to make required reports prevents the NRC from performing its radiological health and safety function and from making a timely assessment of the nature and severity of an incident.

2. A licensee deliberately bypassed the safety interlock systems. The NRC subsequently learned that licensee personnel had willfully violated requirements, and that senior licensee management knew, or should have known, of these violations. When NRC attempted to inspect and investigate these suspected violations, senior licensee management knowingly provided false information to the NRC. Subsequent enforcement action included suspension of the license.

3. A water line fractured in the pool circulation system which resulted in the loss of 5 feet of pool water. The line break led to a loss of shielding water because the intake and outlet pipes were misaligned during maintenance. The pipe break appears to have occurred because the pipe was made of polyvinyl chloride, designed for cold water, rather than for the heated water temperatures typical for the irradiator. The piping was replaced with polypropylene pipe.

4. A night shift operator noticed that the travel time for the source to reach the fully unshielded position was excessive. After completing the next phase of irradiation, the source would not retract to the fully shielded position, even using emergency equipment. The operator discovered that the solenoid valve, that was supposed to retract the source to a shielded position, was frozen due to weather conditions. The valve was in a room above the irradiator facility. The operator went there and turned on a room heater to thaw out the valve so that it would operate. The operator violated license requirements to (1) notify the Radiation Safety Officer (RSO) that the source had not returned to its shielded position because of the frozen valve, and (2) obtain RSO permission to enter and heat the room housing the valve.

5. A licensee had identified a frayed lift cable a few days previously, but instead of immediately replacing the cable, the licensee decided to wait for scheduled maintenance. The cable jammed and froze the source plaque in a less than fully shielded position. Employees cut the cables and let the source plaque free-fall into the pool. The incident could have been prevented by replacing the frayed cable immediately, and selecting cable material with fray-resistant qualities.

6. A source plaque became stuck in the exposed position. Conveyors stopped, the source DOWN light came on, but cell radiation levels remained high. Cable slack data indicated that the plaque was stuck about five and a half feet down from its full-up position. The RSO attempted some raising and lowering maneuvers, but the plaque then stuck in a full-up position. The RSO, able to run the product containers out of the cell, saw some were misaligned on the carrier. The RSO notified a State Inspector, who arrived in the afternoon. It was determined that the plaque cable was off its pulley. The bottom of a splice in the cable was resting on the lip of the tube leading to the cell. After the cable was set on its pulley, the cable was guided through the tube, and the plaque was lowered, until it caught again.

A borrowed radiation-resistant camera arrived the next morning. An adequate view of the plaque was obtained by midnight. Apparently the stationary aluminum shroud between product containers and plaque had been deflected and caught on the plaque frame. The plaque was carefully raised and dropped to break the jam. On the second try, the plaque broke free and dropped into the pool. Analysis revealed that a product container had probably tipped onto the shroud, causing interference with the plaque.

This incident was apparently caused by inadequate design of the shroud. This led to the shroud deforming, which interfered with plaque motion. Inadequate maintenance contributed to the problem. The cable should have been replaced instead of spliced. A few months later, the entire source hoist mechanism failed and had to be replaced. This failure occurred when the source plaque was submerged.

LIST OF RECENTLY ISSUED NMSS INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-78	Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves	11/22/89	All U.S. NRC licensees authorized to possess and use source material and/or special nuclear material for the heating, emptying, filling, or shipping of uranium hexafluoride in 30- and 48-inch diameter cylinders.
89-60	Maintenance of Teletherapy Units	08/18/89	All U.S. NRC Medical Teletherapy Licensees.
89-47	Potential Problems with Worn or Distorted Hose Clamps on Self-Contained Breathing Apparatus	05/18/89	All holders of operating licenses or construction permits for nuclear power reactors and fuel facilities.
89-46	Confidentiality of Exercise Scenarios	05/11/89	All holders of licenses for fuel cycle facilities and byproduct material licensees having an approved emergency response plan.
89-37	Proposed Amendments to 40 CFR Part 61, Air Emission Standards for Radionuclides	04/04/89	All U.S. NRC licensees.
89-35	Loss and Theft of Unsecured Licensed Material	03/30/89	All U.S. NRC byproduct, source and special nuclear material licensees.
89-34	Disposal of Americium Well-Logging Sources	03/30/89	All holders of U.S. NRC specific licenses authorizing well-logging activities.
89-25	Unauthorized Transfer of Ownership or Control of Licensed Activities	03/07/89	All NRC source, byproduct, and special nuclear material licensees.

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
89-59, Supp. 1	Suppliers of Potentially Misrepresented Fasteners	12/6/89	All holders of OLs or CPs for nuclear power reactors.
89-81	Inadequate Control of Temporary Modifications to Safety-Related Systems	12/6/89	All holders of OLs or CPs for nuclear power reactors.
89-80	Potential for Water Hammer, Thermal Stratification, and Steam Binding in High-Pressure Coolant Injection Piping	12/1/89	All holders of OLs or CPs for nuclear power reactors.
89-79	Degraded Coatings and Corrosion of Steel Containment Vessels	12/1/89	All holders of OLs or CPs for LWRs.
89-56, Supp. 1	Questionable Certification of Material Supplied to the Defense Department by Nuclear Suppliers	11/22/89	All holders of OLs or CPs for nuclear power reactors.
89-78	Failure of Packing Nuts on One-Inch Uranium Hexafluoride Cylinder Valves	11/22/89	All NRC licensees authorized to possess and use source material and/or special nuclear material for the heating, emptying, filling, or shipping of uranium hexafluoride in 30- and 48-inch diameter cylinders.
89-77	Debris in Containment Emergency Sumps and Incorrect Screen Configurations	11/21/89	All holders of OLs or CPs for PWRs.
89-76	Biofouling Agent: Zebra Mussel	11/21/89	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit