

## EVENT RATING FORM (ERF)

<b>THE INTERNATIONAL NUCLEAR EVENT SCALE (INES)</b>														
<b>EVENT TITLE</b> Potential Personnel Overexposure at Irradiator Facility											<b>EVENT DATE</b> 2004.04.21			
<b>RATING</b>	<b>RATING DATE</b>	<b>OUT OF SCALE</b>	<b>DEVIATION</b>	<b>INCIDENT</b>			<b>ACCIDENT</b>				<b>FACILITY TYPE</b>			
PROVISIONAL <input type="checkbox"/>			0	1	2	3	4	5	6	7	Power Reactor <input type="checkbox"/>	Research Reactor <input type="checkbox"/>		
FINAL <input checked="" type="checkbox"/>	2004.11.05	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Radwaste Facility <input type="checkbox"/>	Radiation Source <input type="checkbox"/>		
<b>COUNTRY</b> USA			<b>FACILITY NAME</b> Aibonito, Puerto Rico								Irradiation <input checked="" type="checkbox"/>	Transportation <input type="checkbox"/>		
<b>LOCATION</b> Aibonito, Puerto Rico											Fuel Fabrication <input type="checkbox"/>	Fuel Reprocessing <input type="checkbox"/>		
											Research Facility <input type="checkbox"/>	Mining/Milling <input type="checkbox"/>		
											Enrichment Facility <input type="checkbox"/>	Other <input type="checkbox"/>		
<b>OFF-SITE IMPACT</b>											<b>YES</b>	<b>NO</b>		
RELEASE BEYOND AUTHORIZED LIMITS											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
OVEREXPOSURE OF MEMBERS OF PUBLIC											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<b>ON-SITE IMPACT</b>														
CONTAMINATION SPREAD											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
WORKER OVEREXPOSURE											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
DAMAGE TO RADIOLOGICAL BARRIERS											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
DEGRADATION OF DEFENSE IN-DEPTH											<input checked="" type="checkbox"/>	<input type="checkbox"/>		
PERSON INJURED PHYSICALLY OR CASUALTY											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
IS THERE A CONTINUING PROBLEM											<input type="checkbox"/>	<input checked="" type="checkbox"/>		
PRESS RELEASE ISSUED (IF YES, PLEASE ATTACH)											<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>EVENT DESCRIPTION</b>														
<p>On April 21, 2004, an event occurred at an NRC-licensed panoramic wet-source-storage pool irradiator used for sterilization of medical supplies. The irradiator contains two source racks that operate simultaneously, each containing approximately 74 petabecquerel (2 million curies) of cobalt-60, for a total of 148 petabecquerel (4 million curies). The irradiator operator was experiencing problems with the source rack upper-limit switch (up-switch) and attempted to repair it. The up-switch's function is to signal when the source racks are in the raised, exposed position. Faults occurred after repeated attempts to fix the switch when the sources were raised to test the repair, causing the safety interlocks to prevent access to the irradiation room. The alternate radiation safety officer (ARSO) authorized the irradiator operator to defeat the safety interlocks; enter the irradiator via the product exit barrier door; walk through the irradiation room (e.g., room where source racks and pool are located); and open the locked personnel access maze door from inside the room. Defeating safety interlocks to enter the irradiator had been a practice at this facility for a number of years. The repair required the use of a ladder, which was placed over the source pool (adjacent to the rack hoist mechanism). After multiple repair attempts failed during a 6-hour period, the operator forgot to remove the ladder, and with the</p>														

supervision of the ARSO, raised and lowered the source racks to test the repairs that had been made. However, unknown to the operator or ARSO, the ladder jammed against one of the source racks, preventing it from lowering into the pool and into the safe, shielded position. The operator and ARSO incorrectly assumed that the control panel indication of an exposed source rack was a continuation of the source rack switch problem. They believed it was yet another false indication. Based on this incorrect understanding, the ARSO again authorized the irradiator operator to defeat safety interlocks and enter the irradiator via the product exit barrier door.

The operator enlisted the assistance of a materials handler and they entered the irradiator. The materials handler was not wearing required dosimetry for this entry. On entering the irradiator, with only one wall of concrete separating them from direct exposure to the stuck source rack, the operator noticed an unexpectedly high reading on the survey meter and told the material handler to leave immediately, and they both exited immediately. After leaving the irradiator, the operator informed the ARSO of the unexpected radiation levels. The two workers received doses of 44 and 28 millisievert (4.4 and 2.8 rem), respectively, in a matter of seconds. NRC's annual regulatory limit is 0.05 sievert (5 rem) total effective dose equivalent (whole body).

NRC conducted a special inspection to respond to this event and determined the root causes to be:

- failure to implement its emergency procedures under conditions that required them to be implemented
- failure to perform surveys that were adequate to ensure that sources were in a safe storage condition before defeating safety interlocks and entering the irradiator
- failure to identify underlying causes of persistent maintenance problems with the switch systems
- failure of licensee personnel to have a complete understanding of the operation and use of the irradiation room's radiation monitor
- failure to generate clear guidance as to when to engage the emergency procedures
- failure to perform a drill during annual safety training.

**RATING JUSTIFICATION AND DIFFICULTIES ENCOUNTERED**

Final rating for this event is Level 3.

A Level 3 rating is warranted for this event because of the significant potential for unplanned exposures based on degradation of defence in depth. Individuals failed to adequately monitor radiation levels before entering the irradiation room and safety procedures were ignored. See Table 3, Draft Additional Guidance for the INES National Officers for Pilot Use and Feedback, dated 26 May 2004.

148 petabecquerel (4 million curies) of Co-60 is a category 1 source as defined in IAEA TECDOC 1344, Categorization of Radioactive Sources, July 2003.

**CONTACT PERSON FOR FURTHER INFORMATION**

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**links to 2 NRC press releases:**

<http://www.nrc.gov/reading-rm/doc-collections/news/2004/04-049i.html>

<http://www.nrc.gov/reading-rm/doc-collections/news/2004/04-025i.html>

**link to Information Notice:**

<http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/2004/in200418.pdf>