

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, DC 20555-0001

June 25, 2004

NRC INFORMATION NOTICE 2004-12: SPENT FUEL ROD ACCOUNTABILITY

Addressees:

All holders of operating licenses for nuclear power reactors, research and test reactors, decommissioned sites storing spent fuel in a pool, and wet spent fuel storage sites.

Purpose:

The U. S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of issues at two reactor facilities regarding the effectiveness of the material control and accounting (MC&A) program. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems with their spent fuel inventories. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

In November 2000, Northeast Nuclear Energy Company (NNECO), the licensee at the time for Millstone Unit 1, informed the NRC that two full-length irradiated fuel rods were not in the locations specified in the special nuclear material (SNM) accounting records. The two rods had been separated from their fuel assembly when it was disassembled in 1972 for inspection, and had been placed in a container for individual fuel rods in the spent fuel pool (SFP). Records dated 1979 and 1980 show the fuel rods in the container in the SFP. However, SFP records after 1980 do not show either the fuel rods or the container. The records do not indicate what happened to these rods. Investigations by the licensee centered on significant SFP activities between 1980 and 1992 that were potentially related to the missing fuel rods, including two reracks entailing the physical modification of the racks to accommodate more fuel assemblies, and several shipments to facilities licensed to receive irradiated nonfuel components.

On November 26, 2003, the NRC issued Temporary Instruction (TI) 2515/154, based on lessons learned from the above mentioned event at Millstone Unit 1. The TI requires resident inspectors (RIs) to review operating and decommissioned power reactor licensee MC&A programs. The RIs at Vermont Yankee performed the TI in March 2004. The inspectors reviewed whether Entergy, the Vermont Yankee licensee, had written procedures for the control of material in the SFP and had implemented them properly, and whether the licensee had performed an annual physical inventory of items in the SFP, including a visual check to determine if all locations identified on inventory maps actually held rods as indicated.

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On April 20, 2004, in response to the inspectors' concerns with the effectiveness of the SFP inventory methods, Entergy performed a detailed look for two spent fuel rod pieces and found that they were not in their documented locations in the SFP. The two pieces [one about 9 inches long and the other 17.75 inches long (Licensee Event Report 50-271/2004-002, dated June 17, 2004) had been generated during a fuel assembly reconstitution effort in 1979. According to documents prepared at that time, they had been placed in a 5-gallon stainless steel container, with no top, for storage on the bottom of the SFP. The 5-gallon container had been fitted with two vertical stainless steel pipes designed to hold rod pieces.

Entergy's inventory procedures allowed the pieces to be carried on inventory without a visual confirmation as long as the container in which they had been placed was sealed using a "tamper-safe" locking device to assure that the pieces had not been removed. Because the container was not sealed with a tamper-safe device, visual confirmation was required. The inspectors found that instead of visually confirming that the two fuel rod pieces were in the container, Entergy personnel had verified only that the container remained upright and in place at the bottom of the SFP.

#### Discussion:

The licensee's final report for Millstone Unit 1 (ADAMS Accession No. ML012850396) indicated that the investigation was unable to conclusively establish the location of the two spent fuel rods. The report stated that the spent fuel rods were in one of four locations: (i) the Millstone Unit 1 SFP, (ii) GE's Vallecitos Nuclear Center in Pleasanton, CA, (iii) the low-level radioactive waste disposal facility in Barnwell, SC, or (iv) the low-level radioactive waste disposal facility in Richland, WA.

The NRC inspection report for the special inspection (ADAMS Accession No. ML020580132) indicated that the NRC agreed with the licensee's conclusions iii and iv that the missing fuel rods were very likely in a licensed low-level radioactive waste disposal facility. The most likely explanation was that the rods were inadvertently shipped to Barnwell in 1988, as part of a Class C low-level waste shipment. The conclusion of the NRC safety analyses of this incident (ADAMS Accession No. ML041060691) was that if the two fuel rods were at either low-level radioactive waste site, the safety and health impact would be minimal to both the present workers and future generations of the public. Enforcement action was taken on June 25, 2002, which resulted in a Severity Level II violation and a \$288,000 civil penalty.

Currently, Entergy has assembled an investigation team, established a charter, performed camera-aided visual inspections of the SFP, and begun detailed reviews of the SNM inventory/accountability records and interviews of personnel in an attempt to locate the two missing fuel rod pieces.

The NRC is conducting a special inspection of Entergy's actions. The NRC has coordinated with the State of Vermont regarding the State's observation of the inspection, and is keeping other potentially affected States informed. The inspection includes oversight of Entergy's investigation, an audit of records related to SFP activities, and an evaluation of the root causes of the issue.

At both Millstone Unit 1 and Vermont Yankee, the separated fuel rods or pieces were stored in special containers outside of the spent fuel racks in the spent fuel pool. Storage outside of the racks may have contributed to the discrepancies in positive control on the location of the spent fuel.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED  
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2004-11	Cracking in Pressurizer Safety and Relief Nozzles and in Surge Line Nozzle	05/06/2004	All holders of operating licenses or construction permits for nuclear power reactors, except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2004-10	Loose Parts in Steam Generators	05/04/2004	All holders of operating licenses for pressurized-water reactors (PWRs), except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor.
2004-09	Corrosion of Steel Containment and Containment Liner	04/27/2004	All holders of operating licenses for nuclear power reactors except those who have permanently ceased operation and have certified that fuel has been permanently removed from the reactor vessel.
2004-08	Reactor Coolant Pressure Boundary Leakage Attributable to Propagation of Cracking in Reactor Vessel Nozzle Welds	04/22/2004	All holders of operating licensees for nuclear power boiling-water reactors (BWRs), except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

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