

SSINS No.: 6835  
IN 85-12

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

February 11, 1985

IE INFORMATION NOTICE NO. 85-12: RECENT FUEL HANDLING EVENTS

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or construction permit (CP).

Purpose:

This information notice is provided as a notification of potentially significant problems pertaining to recent fuel handling events. This notice supplements Information Notice 80-01, which discussed similar events. It is expected that recipients will review the 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:

Two events have occurred recently at nuclear power plants in which fuel was dropped because of failures or deficiencies in hoist equipment. More details are provided in Attachment 1.

- (1) At Hatch 1 on October 6, 1984, a spent fuel bundle was dropped into its storage cell because of a possible inadvertent actuation of the fuel grapple hook position switch. The switch cover was missing.
- (2) At Millstone 2 on November 8, 1984, a fuel pin dropped in the spent fuel pool during fuel assembly reconstitution because the gripping collet fingers slipped.

Several additional events have occurred that are noteworthy because they involve deficiencies or maloperation of fuel handling equipment or proce-

dures. These are briefly summarized below; more detailed information is given in Attachment 1.

- (1) At Monticello on November 29, 1984, a spent fuel bundle handle was deformed during transportation because of inadequate cask loading procedures.
- (2) At Palisades on April 4, 1984, a new fuel bundle was stuck in the refueling machine because of inadequate spreader bar air supply pressure.

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- (3) At Turkey Point 4 on April 5, 1983, a spent fuel assembly dropped back into its storage cell when the hoist limit switches failed to prevent upward movement of the assembly. This event also involved a procedural inadequacy concerning these limit switches.
- (4) A second event at Turkey Point 4 on April 17, 1983, resulted in an improperly loaded (leaning) fuel assembly.
- (5) At Cook 1 on June 19, 1981, a fuel assembly was damaged in a collision with a shield wall because an entangled air hose had tripped a limit switch.
- (6) Also at Cook 1 on August 4, 1982, a fuel assembly was cocked and lodged in the manipulator bridge mast because the fuel handling procedures were not properly followed.

Discussion:

This information notice briefly describes several events involving failures or deficiencies in fuel handling equipment or procedures. In addition, Information Notice 80-01 discusses two similar events at Pilgrim. In one, a spent fuel assembly was inadvertently raised high enough in the fuel pool to activate area radiation alarms because the lifting hook was caught between the lifting bail and the assembly channel. In the other, a new fuel assembly dropped onto the top of the storage fuel racks when the auxiliary hook latching device failed to hold the lifting bail when the assembly struck the top edge of the racks. The radiological consequences of these events were minimal. Nevertheless, the events are considered significant, in that they

could have compromised plant safety and could have been prevented. Licensees may wish to review their procedures in view of these events.

No specific action 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.

Edward L. Jordan, Director  
Division of Emergency Preparedness  
and Engineering Response  
Office of Inspection and Enforcement

Technical Contact: C. V. Hodge, IE  
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Attachments:

1. Description of Recent Fuel Handling Events
2. List of Recently Issued IE Information Notices

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Description of Recent Fuel Handling Events

Hatch 1

This event involved a possible inadvertent actuation of the fuel grapple hook position switch. On October 6, 1984, with core unloading in progress, a spent fuel bundle was inadvertently dropped into its storage rack cell (a distance of about 12 feet), slightly deforming and scratching the bundle and rack. Before the event, no trouble had been experienced in grappling bundles. When the bridge operator lowered the affected bundle and detected contact of the bundle with the rack, he stopped to align the bundle with its storage cell; then the bundle dropped. The licensee declared an unusual event and terminated it on confirming that no fission gases had been released.

Grapple tests and operator interviews indicated that the operator actions required to position or rotate the fuel bundle could have resulted in inadvertently operating the fuel grapple hook position actuation switch.

General Electric Service Information Letter (SIL) No. 298, dated August 1979, describes the potential for inadvertent switch operation in conjunction with a slack grapple hoist cable before the operator has verified that the fuel bundle is properly seated. General Electric recommends that the owners of BWRs 1 through 4 install a commercially available snap cover over the switch. The licensee had installed the switch covers on the refueling platforms of Units 1 and 2; however, between 1979 and the present, the covers had been removed. The licensee originally used an epoxy-type adhesive to secure the covers, but now has bolted them into place.

#### Millstone 2

This event involved mechanical slipping of the fuel holding mechanism. On November 8, 1984, during fuel assembly reconstitution in the spent fuel pool, a single spent fuel pin was dropped during eddy current testing for cladding defects. The pin was gripped by collet fingers inside a long cylindrical probe. Evidently these fingers slipped, possibly because of a weld repair at the top of the pin. The fingers were adjusted to provide a more positive grip. Although this pin was retrieved, inspected, and showed no defects, it was replaced in its position in the fuel assembly by a stainless steel spacer. The licensee instituted an additional check for proper gripping of each fuel pin and completed the fuel assembly reconstitution.

#### Monticello

This event illustrates the need for an explicit checkpoint in the fuel cask loading procedure. On November 29, 1984, the handle on a spent fuel bundle was found deformed when it was off-loaded from a transportation cask to a storage rack at the GE Morris spent fuel storage facility. The bundle had not been seated properly in the cask because horizontal tabs at the top of the bundle had not been aligned properly with the cask, preventing the bundle from being fully inserted. No radiological effects were caused, but the event is significant because the fuel loading procedures were not carefully followed.

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Surveillance was conducted for this loading of the cask, but there was not an explicit check for proper seating of the bundles before the cask cover

was bolted in place. The licensee's corrective action is to institute such an explicit check in the fuel loading procedures.

#### Palisades

This event involved inoperability of the fuel hoist mechanism. On April 4, 1984, while reloading the core, a new fuel bundle stuck in the refueling machine. A combination of low spreader bar air supply pressure (40 psi vs normal 50 psi) and air leakage from the spreader bar retraction hose fitting resulted in the spreader bar extending downward one inch below the hoist bottom. An interlock for the extended spreader bar prevented movement of the bridge trolley. After evaluating the situation, the licensee increased the air supply pressure and inserted the bundle into the core. The licensee then completed core reload without further problem.

#### Turkey Point 4

This event involved a malfunction of the limit switches on the spent fuel pit hoist and disclosed a procedural inadequacy. On April 5, 1983, during refueling after a six month outage for steam generator repair, partially burned fuel assembly X-13 was being lifted from its storage rack. The limit switches failed to stop the upward movement of X-13, resulting in parting of the hoisting cable and causing the assembly to drop back into its rack.

The crane design provides two different limit switches to restrict upper motion: a power circuit limit switch and a geared limit switch. About three weeks before actual fuel movement, testing indicated the switches would work, but the investigation after the event revealed that a linkage in the power limit switch was unhooked, which disabled the trip feature, and the geared limit switch was out of adjustment. Had the licensee tested the upper limit switch under no load at the beginning of each shift, as required by OSHA regulations [29 CFR 1910.179(n)(4)] or recommended by industry guidance (ANSI B30.2-1976, "Overhead and Gantry Cranes"), this event could have been prevented.

The procedural inadequacy was the incorrect designation of the limit switches. The spent fuel pit crane test procedure indicated that the power circuit switch backed up the geared switch; the operating procedure for that crane incorrectly indicated the opposite. The operating procedure also contradicted the prohibition stated in both procedures against using the two switches as normal stopping devices.

A second event occurred shortly afterward in which improper placement of a fuel assembly into the core was not readily detected. Because of the X-13 drop, it was necessary to reconfigure the core loading sequence. Because only the central area was to be reconfigured, the approved fuel loading sequence started with assemblies on the core perimeter and spiraled inward.

This sequence only provided one or two adjacent surfaces (fuel or baffle plate), instead of the usual four, to guide an assembly being inserted.

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On April 17, 1983, a small maladjustment of the fuel handling bridge position (less than an inch deviation) coupled with a slight bow in twice-burned fuel assembly X-04 led to placing X-04 astride of one of the two locating pins in its intended core position. As a result, X-04 fell over so that it leaned at a 35 degree angle against two other assemblies in the core. Vessel lighting was such that the leaning assembly was not noticed until four additional assemblies had been loaded, about an hour after the presumed fall. No release of fission products occurred.

Cook 1

During refueling operations on June 19, 1981, a fuel assembly was damaged by striking a shield wall retaining lip located in the refueling cavity, approximately six inches high and several feet west of the reactor vessel. The assembly was being transported toward the fuel transfer area by the manipulator crane, but a fouled interlock had apparently allowed the gripper "full up" indicating light to come on without the assembly being fully inside the gripper tube. As a result of the collision, one fuel rod from the 15 x 15 assembly dropped to the cavity floor and lodged behind a ladder. Three other rods appeared bent. The interlock did not operate correctly because an entangled air hose had tripped a limit switch.

A year later, a similar event occurred. During refueling operations on August 4, 1982, fuel movement was suspended when the refueling equipment was incorrectly operated. This resulted in a fuel assembly becoming cocked and lodged in the manipulator bridge mast. The upender device had not been raised to the vertical position before the fuel assembly was lowered. This caused the assembly to slide along the upender cable and give the bridge operator a low load indication. Thinking the fuel assembly was rubbing in the transfer assembly, the operator proceeded to lift the fuel assembly until it became lodged and bent between the mast and the cable, giving a high load reading. The licensee then investigated what had happened and suspended fuel movement. Under an approved special procedure, the cable was slackened. The assembly returned to its former shape except for minor deformation and marks on a few fuel rods.

This event involved a violation of a technical specification requiring that procedures be followed. The crane operator had failed to immediately stop and evaluate the situation (according to procedure) when he observed an unexplained load change while lowering a fuel assembly into the transfer container. The crane operator also failed to check whether this container was in a position to receive fuel.