UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

April 30, 1996

NRC INFORMATION NOTICE 96-26: RECENT PROBLEMS WITH OVERHEAD CRANES

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to recent problems with overhead cranes. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Failure of Overhead Crane Bridge Rail

At the Trojan Nuclear Plant on July 7, 1995, a section of the reactor building polar crane bridge rail failed. The rail had a crack across the top of the top flange and a piece of the flange had been displaced. The end of one section of the rail had failed through the plane of the rail joint bar bolts extending up through the top flange. Visual and metallographic examination of the failure plane indicated that much of the failure was preexisting. Rust on the failure surfaces and "peening" of some areas indicated that the initial crack could extend back to the plant's construction.

The licensee research of construction records determined that a nonconformance report, dated July 26, 1972, noted that the rails were not slotted for bolts in accordance with the drawings. The corrective action recommended was to "burn the slots in the field." The licensee determined the cause of the failure to be torsional shear and bending at the stress risers from the flame-cut holes. Flame cutting the slots left residual stresses in the material because of the lack of careful preheating and controlled cooling. Also, sharp notches, noted in the area of the flame cutting, concentrated the stresses.

The inappropriate use of a cutting torch created an untempered martensitic heat-affected zone in the high-carbon steel rail. This zone was especially sensitive to hydrogen cracking and subsequent brittle crack propagation. The crack inducing and propagating loading was primarily due to bending of the

rail head to the outside during episodes of rail misalignment. The licensee had observed rail misalignment to be a continuing problem that had caused or contributed to 19 bridge truck wheel bearing failures over 23 years of operation.

The root cause of the failure was the inappropriate use of a cutting torch to enlarge drilled holes to slots in the web of the rail. This practice created an untempered, martensitic, heat-affected zone in the rail material that was sensitive to hydrogen cracking and subsequent brittle crack propagation.

Actuation of Overhead Crane Safety System

At the Prairie Island Nuclear Generating Plant on May 13, 1995, while lifting a loaded spent fuel storage cask from the spent fuel pool for transfer to the transport bay, the single-failure-proof overhead crane handling system automatically stopped on overload, approximately 13 cm [5 inches] from the high hook point (peak lift point). The bottom of the cask was above the water but approximately 8 cm [3 inches] below the operating deck of the spent fuel pool. Upon investigation of the event, the licensee, Northern States Power Company (NSP) determined that the cause of the event was premature actuation of the crane overload-sensing system. The setpoint on the overload-sensing system was set too low. Upon actuation of the overload-sensing system, control power is automatically removed from the hoist motor and the conventional holding brakes are activated. Subsequent to the actuation on May 13, the cask remained in the hoisted position until a safety evaluation was made that supported bypassing the sensing system and resuming the cask lift. The lift was resumed about 16 hours after it was stopped, and the cask was placed in the decontamination area of the transport bay. NSP initiated a root-cause analysis to identify the cause of the actuation. The conclusion of this analysis was that the overload-sensing system was inaccurately calibrated.

This event raises a concern for similarly designed overload-sensing systems associated with single-failure-proof cranes. As noted in the analysis reports, this event was a "nuisance trip" that resulted from inaccurate initial calibration during load cell setting adjustment. Improved load cell accuracy can help to reduce any unbalanced loading condition in the system.

Additional details of these events can be found in Inspection Report No. 50-344/95-06 issued on September 18, 1995, and Inspection Report No. 50-282/95-06 issued on June 27, 1995.

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.

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LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
96-25	Transversing In-Core Probe Overwithdrawn at LaSalle County Station, Unit 1	04/30/96	All holders of OLs or CPs for nuclear power reactors
96-24	Preconditioning of Molded-Case Circuit Breakers Before Surveillance Testing	04/25/96	All holders of OLs or CPs for nuclear power reactors
96-23	Fires in Emergency Diesel Generator Exciters During Operation Following Undetected Fuse Blowing	04/22/96	All holders of OLs or CPs for nuclear power reactors
96-22	Improper Equipment Settings Due to the Use of Nontemperature-Compensated Test Equipment	04/11/96	All holders of OLs or CPs for nuclear power reactors
96-21	Safety Concerns Related to the Design of the Door Interlock Circuit on Nucletron High-Dose Rate and Pulsed Dose Rate Remote Afterloading Brachytherapy Devices	04/10/96	All U.S. NRC Medical to the Licensees authorized to use brachytherapy sources in high- and pulsed-dose-rate remote afterloaders
96-20	Demonstration of Associated Equipment Compliance with 10 CFR 34.20	04/04/96	All industrial radiography licensees and radiography equipment manufacturers
96-19	Failure of Tone Alert Radios to Activate When Receiving a Shortened Activation Signal	04/02/96	All holders of OLs or CPs for nuclear power reactors
96-18	Compliance with 10 CFR Part 20 for Airborne Thorium	03/25/96	All material licensees authorized to possess and use thorium in unsealed form

OL = Operating License
CP = Construction Permit

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Original signed by Brian K. Grimes

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Additional details of these events can be found in Inspection Report No. 50-344/95-06 issued on September 18, 1995 and Inspection Report No. 50-282/95-06 issued on June 27, 1995. 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.

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More detailed descriptions of these events are included in Attachment 1 to this Information Notice. 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.

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