

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

December 11, 1991

NRC INFORMATION NOTICE 91-80: FAILURE OF ANCHOR HEAD THREADS ON POST-TENSIONING SYSTEM DURING SURVEILLANCE INSPECTION

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 problems associated with failure of internal threads on post-tensioned containment tendon anchor heads during a tendon surveillance. 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

On August 1, 1991, while the Duke Power Company (the licensee) was conducting the post-tensioning system surveillance inspections at Oconee Nuclear Station, Unit 1, as required by the technical specifications, the internal threads on one of the tendon anchor heads failed while the tendon was being loaded (stressed) with a hydraulic jack (stressing ram). The stressing load was applied to the tendon by the pull bar on the stressing ram which couples to the internal threads on the anchor head. The pull bar was engaged to three-fourths of the threads on the anchor head. When the threads on the anchor head failed, the stressing ram disengaged from the anchor head, swung free from the tendon, and posed a safety hazard to personnel performing the tendon surveillance. Fortunately no injuries occurred. The licensee has suspended further tendon surveillance operations until it reviews the results of an investigation into the cause of the anchor head thread failure.

The licensee visually examined the remaining threads on the damaged anchor head and found that the threads had yielded before the current tendon surveillance inspection. Duke Power also visually examined anchor heads on other tendons and determined that the threads were also deformed, having been subjected to stresses exceeding the material yield point. The licensee performed a stress analysis of the threads on the anchor heads under application of maximum loads applied during tendon stressing operations. This analysis disclosed that the actual load applied to the threads during stressing operations exceeded the anchor head material shear yield stress, which explains the observed

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updated on 12/30/91

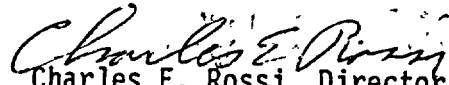
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deformations of the threads on the anchor heads. Duke Power Company is continuing to investigate this problem and is evaluating its effect on future tendon surveillance inspections.

Discussion

Because the integrity of the post-tensioned concrete containment structure is based on a highly redundant system of several hundred elements, the failure of one such element in a family of tendons would not significantly jeopardize containment structural capability. However, the failure of the threads as occurred at Oconee could adversely affect occupational safety.

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


Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical contact: Joseph J. Lenahan, RII
(404) 331-4190

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
 NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
91-79	Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials	12/06/91	All holders of OLs or CPs for nuclear power reactors.
88-92, Supp. 1	Potential for Spent Fuel Pool Draindown	11/29/91	All holders of OLs or CPs for nuclear power reactors.
91-78	Status Indication of Control Power for Circuit Breakers Used in Safety-Related Applications	11/28/91	All holders of OLs or CPs for nuclear power reactors.
90-57, Supp. 1	Substandard, Refurbished Potter & Brumfield Relays Represented as New	11/27/91	All holders of OLs or CPs for nuclear power reactors.
91-77	Shift Staffing at Nuclear Power Plants	11/26/91	All holders of OLs or CPs for nuclear power reactors.
91-76	10 CFR Parts 21 and 50.55(e) Final Rules	11/26/91	All holders of OLs or CPs and vendors for nuclear power reactors.
91-75	Static Head Corrections Mistakenly not Included in Pressure Transmitter Calibration Procedures	11/25/91	All holders of OLs or CPs for nuclear power reactors.
91-74	Changes in Pressurizer Safety Valve Setpoints Before Installation	11/25/91	All holders of OLs or CPs for nuclear power reactors.
91-73	Loss of Shutdown Cooling During Disassembly of High Pressure Safety Injection System Check Valve	11/21/91	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
 CP = Construction Permit

deformations of the threads on the anchor heads. Duke Power Company is continuing to investigate this problem and is evaluating its effect on future tendon surveillance inspections.

Discussion

Because the integrity of the post-tensioned concrete containment structure is based on a highly redundant system of several hundred elements, the failure of one such element in a family of tendons would not significantly jeopardize containment structural capability. However, the failure of the threads as occurred at Oconee could adversely affect occupational safety.

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*Original Signed by
Charles E. Rossi*

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

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(404) 331-4190

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Document Name: FAILURE ANCHOR HEAD POST TENSI

*SEE PREVIOUS CONCURRENCES

*OGCB:DOEA:NRR
NPKadambi
11/08/91

*RII
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11/08/91

*RII
Julian
12/02/91

*D/RII
Gibson
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CERossi
12/11/91
*C/OGCB:DOEA:NRR
CHBerlinger
12/04/91
*RPB:ADM
TechEd
11/21/91

tions exceeded the anchor head material shear yield stress, which explains the observed deformations of the threads on the anchor heads. Duke Power Company is continuing their investigation of this problem and is evaluating its effect on future tendon surveillance inspections.

Discussion

Because the integrity of the post tensioned concrete containment structure is based on a highly redundant system of numerous elements (several hundred), the failure of one such element in a family of tendons does not significantly jeopardize containment structural capability. However, the failure of the threads as occurred at Oconee raises concerns regarding occupational safety.

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Charles E. Rossi, Director
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Office of Nuclear Reactor Regulation

Technical Contact: Joseph J. Lenahan, Region II
(404) 331-4190

Attachments:
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<i>RPK</i> OGCB:DOEA:NRR	<i>Telephone</i> RII <i>Concurrence</i>	JM	C/OGCB:DOEA:NRR	D/DOEA:NRR
NPKadambi	JJL	RPB:ADM	CHBerlinger	CERossi
11/8/91	JJLenahan	TechEd	11/ /91	11/ /91
	11/8/91	11/7/91		
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deformations of the threads on the anchor heads. Duke Power Company is continuing to investigate this problem and is evaluating its effect on future tendon surveillance inspections.

Discussion

Because the integrity of the post-tensioned concrete containment structure is based on a highly redundant system of several hundred elements, the failure of one such element in a family of tendons would not significantly jeopardize containment structural capability. However, the failure of the threads as occurred at Oconee could adversely affect occupational safety.

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RPB:ADM
TechEd *Ming*
11/21/91

PHONE CONCURRENCE

*Discussed with
J. Richardson on
12/5/91 / CE Rossi*

CHB