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ACCESSION NBR:9204280387 DOC.DATE: 92/04/23 NOTARIZED: NO DOCKET #
 FACIL:50-263 Monticello Nuclear Generating Plant, Northern States 05000263
 AUTH.NAME AUTHOR AFFILIATION
 SENGHER,A. Northern States Power Co.
 PARKER,T.M. Northern States Power Co.
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 91-008-01:on 910422,discovered linear indications on 37
 of 72 CRD housing flange cap screws just below cap screw
 head.Caused by stress corrosion initiating at bottom of
 corrosion pits.New cap screws installed.W/920423 ltr.

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 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:NRR/LONG,W.

05000263

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INTERNAL:	ACNW		2	2		AEOD/DOA		1	1
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	RES/DSIR/EIB		1	1		RGN3 FILE 01		1	1
EXTERNAL:	EG&G BRYCE,J.H		3	3		L ST LOBBY WARD		1	1
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NOTES: 1 1

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Northern States Power Company

414 Nicollet Mall
Minneapolis, Minnesota 55401-1927
Telephone (612) 330-5500

April 23, 1992

Report Required by
10 CFR Part 50, Section 50.73

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Inadequate Control Rod Drive Cap Screw Design
Resulting in Stress Corrosion Cracking Indications

The revised Licensee Event Report for this occurrence is attached. Upon further evaluation of this event it was determined that it was not reportable. We are submitting this revision to document our final resolution of this issue.

Please contact us if you require further information.

Thomas M Parker
Manager
Nuclear Support Services

c: Regional Administrator - III NRC
Sr Resident Inspector, NRC
NRR Project Manager, NRC
State of Minnesota,
Attn: Kris Sanda

Attachment

9204280387 920423
PDR ADOCK 05000263
S PDR

IE22
11

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Monticello Nuclear Generating Plant										DOCKET NUMBER (2) 0 5 0 0 0 2 6 3										PAGE (3) 1 OF 4			
TITLE (4) Inadequate Control Rod Drive Cap Screw Design Resulting in Stress Corrosion Cracking Indications																							
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)													
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES					DOCKET NUMBER(S)									
0	4	2	2	9	1	9	1	0	0	8	0	1	0	4	2	3	9	2	0 5 0 0 0				
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																					
POWER LEVEL (10)		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)									
0 0 0		20.405(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)									
		20.405(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)									
		20.405(a)(1)(iii)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(A)				None									
		20.405(a)(1)(iv)				50.73(a)(2)(iii)				50.73(a)(2)(viii)(B)													
		20.405(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(x)													
LICENSEE CONTACT FOR THIS LER (12)																							
NAME												TELEPHONE NUMBER											
Amy Senger, System Engineer												AREA CODE		6 1 2 2 9 5 - 1 4 6 3									
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																							
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS													
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR							
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)												<input checked="" type="checkbox"/> NO											

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

ABSTRACT

During the 1991 refueling outage 37 of 72 Control Rod Drive housing flange cap screws examined displayed linear indications just below the cap screw head. Upon discovery of the indications, a Safety Review Item addressing safety concerns was prepared. Four new, original equipment cap screws were installed in each Control Rod Drive housing flange. A reactor vessel hydro was performed.

Cap screws were sent to three labs for testing to determine the mode of failure. All labs found similar shallow, rounded, oxide-filled indications. These indications showed no signs of active crack propagation. In addition, all tensile tests done on bolts exhibiting the most extreme indications showed no decrease in tensile strength. Cap screws will be inspected during normal Control Rod Drive maintenance activities, and replaced with original design cap screws as needed.

**LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION**

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Monticello Nuclear Generating Plant	0 5 0 0 0 2 6 3	9 1	— 0 0 8	— 0 1	0 2	OF	0 4

TEXT (If more space is required, use additional NRC Form 366A's) (17)

DESCRIPTION

On April 22, 1991, while changing out Control Rod Drives during a refueling outage, Quality Control personnel discovered linear indications on 37 of 72 Control Rod Drive housing flange cap screws just below the cap screw head. The indications were discovered during nondestructive examination of the cap screws during drive change out. Cap screw examination had been included in the Control Rod Drive change out procedure as recommended in General Electric Service Information Letter 483 Revision 0, "CRD Cap Screw Crack Indications."

Samples of the cap screw were sent to three independent laboratories for destructive testing. All labs found that the indications were shallow with rounded, oxide-filled bottoms. There is some question as to whether the indications were actually cracks, or if they were manufacturing imperfections that were uncovered by a corrosion pitting process. All tests concluded that if any cracking had occurred, it was either arrested or so slow that the corrosion process had overtaken it. All tests found that the tensile strength of the capscrews with the most severe indications was well within the limits of the ASTM specification.

This condition was originally reported under 10 CFR 50.73(a)(2)(vi), since it was believed to represented a degradation of the Reactor coolant pressure boundary. Subsequent analysis has confirmed that no degradation of the Reactor coolant pressure boundary existed, therefore, the original Licensee Event Report (91-008 Rev 0) is withdrawn. This supplemental report is voluntary and is provided to document our resolution to this event.

CAUSE

In May 1988, General Electric issued a notification (RICSIL 019) of shallow linear indications that were observed in Control Rod Drive housing cap screws at an operating boiling water reactor. The indications were detected during the required ASME Code visual in-service examination of the cap screws. General Electric indicated that there was no safety significance to the event. The RICSIL attributed the indications to stress corrosion initiating at the bottom of corrosion pits. It was thought that the cracking was aggravated by the presence of manganese sulfide inclusions in the cap screw material. In March 1989, General Electric issued a follow-up document on this subject (Service Information Letter 483, Revision 0) which attributed the cracking to "a general corrosion cracking mechanism". In October of 1991, SIL 483 Revision 1 was released, in which the nomenclature was changed to "stress corrosion".

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

A total of eleven Monticello bolts with the most severe indications were independently analyzed by three labs. None of these analyses showed any sign of an ongoing fatigue or stress corrosion cracking mechanism. If any cracking had ever occurred, it had since been halted. The corrosion pitting that is related to the indications is probably caused by the wet environment under the reactor vessel, the capscrew's inverted position, and lack of drainage from the head area. It is not clear whether the deeper indications were caused by cracks that had halted and filled with oxide, or if they were pre-existing manufacturing imperfections that had been uncovered by corrosion. In either case, there was no active crack propagation occurring at the time the bolts were removed.

ANALYSIS

Replacing the cap screws with original design equipment is acceptable because the General Electric investigation of the problem has shown that indication growth is very slow or self arresting. This is further evidenced by the Monticello cap screws, which have been in service since original plant startup with no failures. Destructive testing of the cap screws with the most severe indications has shown that their tensile strength is well within the limits of the A-193 B-7 specification. Cap screws will be inspected during scheduled control rod drive maintenance and cap screws with indications of cracking will be replaced.

Based on the analysis of the cap screws this event did not pose any health or safety risk to the public.

CORRECTIVE ACTION

Completed Corrective Actions:

1. Safety Review Item 91-016, Cracked Cap Screws, was prepared to address the safety concerns associated with refueling, the cap screw change out, and operation with four possibly cracked cap screws.
2. Four new, original equipment cap screws were installed on each Control Rod Drive.
3. A reactor vessel hydro was performed to ensure Control Rod Drive housing flange integrity prior to reactor start up.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

4. Destructive testing on a sample of screws, which were picked as having the most severe indications, was performed.

Planned Corrective Actions:

None

ADDITIONAL INFORMATION

Failed Component Identification:

No Components Failed.

The subject cap screws are SA-193 B7, made of low alloy, high strength, AISI 4140 material. General Electric part No. 117C4515P002

Previous Similar Events: None