Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043
Tel 269 764 2000

Anthony J. Vitale
Site Vice President

PNP 2012-085

October 11, 2012

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Degraded Condition Due to Control Rod Drive Mechanism Housing Assembly Crack
Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Dear Sir or Madam:

Licensee Event Report (LER) 2012-001 is enclosed. The LER describes the discovery of a through-wall crack that was identified in the housing assembly for control rod drive mechanism number 24. The occurrence is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73 (a)(2)(ii)(A).

This letter contains no new commitments and no revisions to existing commitments.

Sincerely,

ajv/tad

Attachment: LER 2012-001, Degraded Condition Due to Control Rod Drive Mechanism Housing Assembly Crack

CC Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC

ATTACHMENT

LER 2012-001

DEGRADED CONDITION DUE TO CONTROL ROD DRIVE MECHANISM HOUSING ASSEMBLY CRACK

3 Pages Follow

NRC FORM 366
U.S. NUCLEAR REGULATORY COMMISSION
(10-2010)

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB NO. 3150-0104 EXPIRES 10/31/2013

Estimated burden per response to comply with this mandatory information collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
PALISADES NUCLEAR PLANT	05000255	1 OF 3

4. TITLE

Degraded Condition Due to Control Rod Drive Mechanism Housing Assembly Crack

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	12	2012	2012	- 001	- 00	10	11	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

3

10. POWER LEVEL

0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☒ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Otto Gustafson, Licensing Manager	(269) 764-2049

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	AA	DRIV	C490	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO

15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 12, 2012, with the plant in Mode 3, a primary coolant system pressure boundary leak was identified in control rod drive mechanism (CRDM) number 24 upper housing assembly. Upon identification, the plant was placed in Mode 5 to effect repairs.

Initial examination, using liquid penetrant testing in the area of the leak, identified a 1/8" x 1/16" L-shaped crack indication on the outside surface of the type 316L stainless steel pipe section of the CRDM-24 upper housing assembly. Subsequent non-destructive and destructive examinations revealed a total of nine axially oriented crack indications, located in the proximity of an inside surface weld onlay. One of the nine crack indications was a through-wall crack at the leak point approximately 3" in length.

The CRDM-24 upper housing assembly was removed and replaced with an upper housing assembly of modified design. Examinations using ultrasonic testing of eight additional CRDM upper housing assemblies were performed on an area 1" below to 1-1/2" above the area of interest. No deficiencies were noted.

The direct cause for the cracking identified in CRDM-24 was transgranular stress corrosion cracking (TGSCC). TGSCC was the result of stress in the proximity of the inside surface weld onlay caused by manufacturing irregularities and misalignments between CRDM-24 upper housing assembly and supporting components. Based on the lack of crack indications in the additional eight upper housing assemblies examined, the failed CRDM-24 upper housing assembly was subject to an additional stress that has not yet been identified.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
PALISADES NUCLEAR PLANT	05000255	2012	- 001 -	00	2 OF 3

EVENT DESCRIPTION

A slightly increasing trend in primary coolant system (PCS) [AB] unidentified leakage was realized soon after plant start-up on July 14, 2012. Extensive efforts to determine the source of the unidentified leakage during power operations were unsuccessful. Unidentified leakage had trended from approximately 0.2 gallons per minute (gpm) to 0.35 gpm. At approximately 2300 hours on August 11, 2012, a plant shutdown began from full power operation in accordance with plans to confirm the source of the leakage and make repairs. At approximately 0400 hours on August 12, 2012, with the plant in Mode 3 at normal operating temperature and pressure, a PCS pressure boundary leak was identified in the upper housing assembly for control rod drive mechanism (CRDM) number 24 [DRIV;AA]. No structures, components, or systems were inoperable or contributed to the event at the time of discovery. The plant was placed in Mode 5 at approximately 2000 hours on August 12, 2012, to effect repairs.

Initial examination, using liquid penetrant testing in the area of the leak, identified a 1/8" x 1/16" L-shaped crack indication on the outside surface of the type 316L stainless steel pipe section of the CRDM-24 upper housing assembly. Subsequent non-destructive and destructive examinations revealed a total of nine axially oriented crack indications, located in the proximity of an inside surface weld onlay. One of the nine crack indications was a through-wall crack at the leak point approximately 3" in length.

CAUSE OF THE EVENT

The direct cause for the crack indications in the CRDM-24 upper housing assembly was transgranular stress corrosion cracking (TGSCC). TGSCC was the result of stresses applied in the proximity of the inside surface weld onlay caused by manufacturing irregularities and misalignments between CRDM-24 upper housing assembly and supporting components. Based on the lack of crack indications in the additional eight upper housing assemblies examined, the failed CRDM-24 upper housing assembly was subject to an additional stress that has not yet been identified.

CORRECTIVE ACTIONS TAKEN

The CRDM-24 upper housing assembly was removed and replaced with an upper housing assembly of modified design. Examinations using ultrasonic testing of eight additional CRDM upper housing assemblies were performed on an area 1" below to 1-1/2" above the area of interest. No deficiencies were noted.

CORRECTIVE ACTIONS TO BE TAKEN

An inspection plan for CRDM upper housings assemblies will be developed and implemented for future refueling outages. There are several ongoing analyses of the examination data

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
PALISADES NUCLEAR PLANT	05000255	2012	- 001	- 00	3 OF 3

gathered for this event. Upon completion of the analyses, a review of the final evaluation reports will be performed to determine if additional corrective actions are needed.

ASSESSMENT OF SAFETY CONSEQUENCES

The safety significance of the CRDM-24 through-wall crack was determined to be very low. The crack and associated leakage were very small. An analysis of potential crack growth rate confirmed that leakage would have been easily detected, allowing actions to be taken well in advance of the crack reaching the critical flaw size.

PREVIOUS SIMILAR EVENTS

LER 1986-040-03	Cracking of Control Rod Drive Seal Housings
LER 1998-014-00	Control Rod Drive Seal Housing Leak
LER 1999-004-01	Control Rod Drive Seal Housing Leaks and Crack Indications
LER 2001-002-00	Control Rod Drive Seal Housing Leak and Crack Indications
LER 2001-004-01	Control Rod Drive Mechanism Upper Housing Assembly Crack Indications

Previous failures of CRDM seal housings and upper housing assemblies were attributed to TGSCC. No evidence was found to suggest that the corrective actions implemented from similar occurrences would have prevented the failure of CRDM-24.