



Entergy Nuclear Operations, Inc.
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Anthony J. Vitale
Site Vice President

PNP 2012-001

January 31, 2012

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

SUBJECT: Licensee Event Report 2011-004-01, Turbine-Driven Auxiliary
Feedwater Pump Inoperable in Excess of Technical Specification
Requirements Due to Unexpected Trip

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

REFERENCES: 10 CFR 50.73

Dear Sir or Madam:

Supplemental Licensee Event Report (LER) 2011-004-01 is enclosed. The event was originally reported on July 8, 2011. At that time, additional causal evaluations were ongoing. The enclosed supplemental LER includes the results of the additional evaluations and subsequent corrective actions.

Summary of Commitments

This letter contains no new commitments. This letter completes a commitment to provide a supplemental LER as described in the LER submittal of July 8, 2011, and the commitment revision letter submitted December 9, 2011.

The completed commitment is as follows:

ENO will provide a supplement to LER 2011-004 containing the results of the additional causal evaluation and potential new corrective actions by January 31, 2012.

Sincerely,



ajv/tad

Attachment: Licensee Event Report 2011-004-01

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

1. FACILITY NAME PALISADES NUCLEAR PLANT	2. DOCKET NUMBER 05000255	3. PAGE 1 of 4
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4. TITLE:
 Turbine-Driven Auxiliary Feedwater Pump Inoperable in Excess of Technical Specification Requirements Due to Unexpected Trip

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
05	10	2011	2011	004	01	01	31	2012	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
10. POWER LEVEL 99	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Terry Davis	TELEPHONE NUMBER (Include Area Code) (269) 764-2117
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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
D	BA	TRB	E220	Y					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 10, 2011, during routine auxiliary feedwater (AFW) pump Technical Specification (TS) testing, the turbine-driven AFW pump, P-8B, tripped due to the unexpected actuation of the mechanical overspeed trip linkage. Examinations revealed that the knife-edge of the trip resetting lever had disengaged from the hand trip lever latch area allowing the trip valve assembly to isolate steam flow to the turbine-driver.

The initial causal evaluation determined supplemental contract employees had inappropriately applied grease to knife-edge area on the mechanical overspeed trip linkage during maintenance activities performed in the October 2010 refueling outage. Therefore, P-8B and its corresponding AFW train were considered inoperable for a period of time longer than the 72 hours allowed by TS 3.7.5.A.

Based on the information available at that time, greasing of the knife-edge area on the mechanical overspeed trip linkage was considered to be the sole cause of the P-8B trip. Subsequent discussions with the turbine vendor revealed other possible causes for the trip. In addition, an independent analysis determined that the greasing alone, would not account for the overspeed trip of the pump turbine. As a result, additional investigations were completed. The outcome of the investigations did not identify any single physical cause for the pump trip. However, several other potential causes were identified. All the identified potential causes for the overspeed trip were addressed to ensure overspeed trip reliability.

Planned corrective actions include a revision to the applicable maintenance procedure to incorporate vendor recommendations, process enhancements in the identification of critical maintenance activities and ensuring appropriate oversight of supplemental workers performing critical maintenance activities.

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PLANT CONDITIONS

On May 10, 2011, at the time the turbine-driven auxiliary feedwater (AFW) pump (P-8B) tripped, the plant was operating at approximately 99% power.

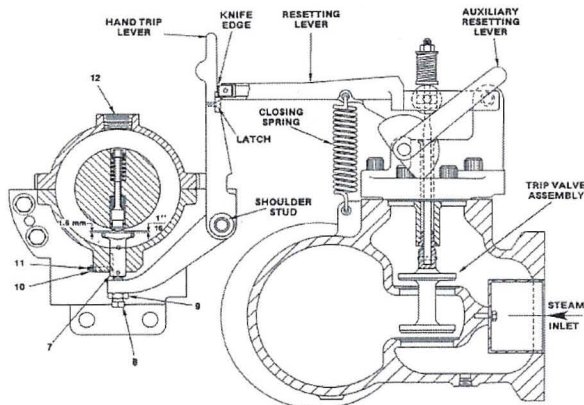
EVENT DESCRIPTION

The Palisades AFW system [BA] supplies water to the secondary side of the steam generators for reactor decay heat removal when normal feedwater sources are unavailable. The system consists of two electric motor-driven pumps, P-8A and P-8C, and one turbine-driven [TRB] pump [P], P-8B. Any one of the three pumps can supply 100% of the required feedwater flow to both steam generators.

Between October 6 and 22, 2010, during the 1R21 refueling outage, several maintenance activities were performed on the turbine-driver, and the associated mechanical overspeed trip linkage, on P-8B. On October 28, 2010, P-8B was returned to operable status following satisfactory completion of Technical Specifications (TS) surveillance test, RO-145, "Comprehensive Pump Test." The pump was required to be operable when the reactor was made critical on October 29, 2010, following the 1R21 refueling outage. P-8B operated satisfactorily again on February 15, 2011, for the required periodic TS surveillance test, QO-21, "Inservice Test."

On May 10, 2011, during TS surveillance test, RO-97, "AFW Automatic Initiation Test," P-8B, tripped due to the unexpected actuation of the mechanical overspeed trip linkage allowing the trip valve assembly to isolate steam flow to the turbine-driver. An examination revealed that the knife-edge of the trip resetting lever had disengaged from the hand trip lever latch area allowing the trip valve assembly to isolate steam flow to the turbine-driver.

A past operability evaluation identified there was one instance between October 29, 2010, and May 10, 2011, when the contact point between the hand trip lever and the resetting lever was disturbed. On February 14, 2011, in accordance with TS surveillance test, QO-21, the resetting lever was manually lowered then raised, causing the trip valve assembly to travel from the open to closed to open position (see figure below). This manipulation is performed to verify freedom of movement of the trip valve assembly. A QO-21 post-test check was performed that ensured proper alignment, i.e., no gap, between the resetting lever and the hand trip lever. No physical manipulations are performed as a part of this post-test alignment check. The alignment check was also performed on May 10, 2011, prior to pump operation for TS surveillance test, RO-97. No discrepancies were identified.



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CAUSE OF THE EVENT

The initial causal evaluation determined supplemental contract employees had inappropriately applied grease to knife-edge area on the mechanical overspeed trip linkage during maintenance activities performed in the October 2010 refueling outage. Based on the information available at that time, the greasing of the knife-edge on the mechanical overspeed trip linkage was considered to be the sole cause of the P-8B trip.

Subsequent discussions with the turbine vendor revealed other possible causes for the trip could have existed. Greasing of the knife-edge area may not have been the only cause. To address the actual impact of the greased knife-edge condition, Entergy Nuclear Operations, Inc. (ENO) contracted an independent engineering firm to perform a force analysis on the overspeed trip mechanism components. The preliminary force analysis results showed that the greasing of the knife-edge area on the mechanical overspeed trip linkage alone would not have caused the trip.

Based on this information, it was determined that a P-8B maintenance outage was needed to investigate other possible causes, identified by the turbine vendor, by gathering supporting/refuting evidence for a failure mode analysis (FMA) and to obtain field data critical for completion of a formal force analysis. P-8B was removed from service on October 25, 2011 for inspection. Data collected during the maintenance outage was used to complete the FMA and formal force analysis. The FMA was used as input for a root cause evaluation.

The root cause evaluation did not identify any single physical cause for the pump trip. Several potential physical causes were identified. The evaluation concluded that preparation for, and execution of, the P-8B turbine overhaul during October 2010 refueling outage did not maintain the turbine and turbine governor in a manner that ensured overspeed trip reliability.

The conclusion of the independent engineering firm's formal force analysis remained the same. Greasing of the knife-edge area on the mechanical overspeed trip linkage alone, could not have caused the overspeed trip.

CORRECTIVE ACTIONS TAKEN

On May 11, 2011, the grease was removed from the mechanical overspeed trip linkage, the mechanical overspeed trip linkage was reset, and TS surveillance test, RO-97, was completed satisfactorily. On May 12, 2011, after satisfactory completion of TS surveillance test, QO-21, P-8B was returned to operable status. During the October 2011 maintenance outage, all the identified potential physical causes for the overspeed trip were addressed to ensure overspeed trip reliability.

CORRECTIVE ACTIONS TO BE TAKEN

Planned corrective actions include a revision to the applicable maintenance procedure to incorporate vendor recommendations, process enhancements in the identification of critical maintenance activities and ensuring appropriate oversight of supplemental workers performing critical maintenance activities.

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ASSESSMENT OF SAFETY CONSEQUENCES

The event is considered to be of low safety significance based on the availability of AFW from at least one alternate AFW pump. AFW flow remained available via operable AFW pumps P-8A and P-8C, except for two brief periods (< one hour each); once on April 28, 2011, when P-8C was inoperable due to being in manual control for testing and once on May 10, 2011, when P-8A was inoperable due to being in manual control for testing. In either of those instances, if needed, operators would have been directed by procedure to recover steam generator level, and could have readily started P-8A or P-8C from the control room. In addition, the ability to manually reset the mechanical overspeed trip linkage on P-8B is proceduralized and considered a simple task that can be executed in a relatively short period of time.

PREVIOUS SIMILAR EVENTS

None