



April 6, 2006

L-PI-06-020
10 CFR 50.73

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

Prairie Island Nuclear Generating Plant Unit 2
Docket 50-306
License No. DPR-60

LER 2-06-01, Unit 2 Shutdown Required by Technical Specifications Due to Inoperable
Emergency Diesel Generator

The Licensee Event Report for this occurrence is attached. Please contact us if you
require additional information related to this event.

Summary of Commitments

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

Thomas J. Palmisano
Site Vice President, Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC
Glenn Wilson, State of Minnesota

ENCLOSURE

LICENSEE EVENT REPORT 2-06-01

4 pages follow

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION (6-2004)	APPROVED BY OMB NO. 3150-0104	EXPIRES 6-30-2007
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)		
Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0066), Office of Management and Budget, Washington, DC 20503. If a means used to impose an 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.		

FACILITY NAME (1) Prairie Island Nuclear Generating Plant Unit 2	DOCKET NUMBER (2) 05000 306	PAGE (3) 1 of 4
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TITLE (4)
 Unit 2 Shutdown Required by Technical Specifications Due to Inoperable Emergency Diesel Generator

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
2	5	06	06	-- 01	-- 0	4	6	06	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 31. (Check all that apply) (11)							
POWER LEVEL (10)		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)			50.73(a)(2)(iv)(A)	73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	
			20.2203(a)(2)(iv)		X	50.73(a)(2)(i)(A)			50.73(a)(2)(v)(D)	
			20.2203(a)(2)(v)			50.73(a)(2)(i)(B)			50.73(a)(2)(vii)	
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)	
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Jeff Kivi	TELEPHONE NUMBER (Include Area Code) 651.388.1121
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO		MONTH	DAY	YEAR

ABSTRACT

On January 29, 2006, Nuclear Management Company, LLC, (NMC) Staff removed the Train B, Unit 2 emergency diesel generator (D6) from service for planned maintenance. Technical Specification (TS) 3.8.1, "AC Source - Operating," Condition B, "One DG inoperable," was entered. TS Required Action 3.8.1.B.4 requires D6 be restored to operable status with a Completion Time of 7 days. The planned maintenance activities included replacing two sets of two pistons, rings and cylinder liners on Engine 2 of D6 (D6 is a tandem-engine diesel generator). Return-to-service testing was initiated on February 3, 2006, and at approximately 0000 CST on February 4, 2006, the test was halted due to high-indicated crankcase pressure on Engine 1 (not the engine that was worked on). The test procedure specified shutting down the diesel generator if crankcase pressure on either engine exceeds 30mm for more than a few minutes (the setpoint for the crankcase pressure trip is 52 mm).

Initial investigation of the cause of the high-indicated crankcase pressure on Engine 1 attributed the crankcase pressure to abnormal blow-by. Evaluation of the scope of work to return D6 to operable status and the schedule for completing the work indicated that repairs could not be completed within the remainder of the 7-day Completion Time. NMC commenced shutdown of Unit 2 on February 5, 2006.

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

EVENT DESCRIPTION

On January 29, 2006, Nuclear Management Company, LLC, (NMC) Staff removed the Train B, Unit 2 emergency diesel generator¹ (D6) from service for planned maintenance. Technical Specification (TS) 3.8.1, "AC Source - Operating," Condition B, "One DG inoperable," was entered. TS Required Action 3.8.1.B.4 requires D6 be restored to operable status with a Completion Time of 7 days. The planned maintenance activities included replacing two sets of two pistons, rings and cylinder liners on Engine 2 of D6 (D6 is a tandem-engine diesel generator). Return-to-service testing was initiated on February 3, 2006, and at approximately 0000 CST on February 4, 2006, the test was halted due to high-indicated crankcase pressure on Engine 1 (not the engine that was worked on). The test procedure specified shutting down the diesel generator if crankcase pressure on either engine exceeds 30mm for more than a few minutes (the setpoint for the crankcase pressure trip is 52 mm).

Initial investigation of the cause of the high-indicated crankcase pressure on Engine 1 attributed the crankcase pressure to abnormal blow-by. Evaluation of the scope of work to return D6 to operable status and the schedule for completing the work indicated that repairs could not be completed within the remainder of the 7-day Completion Time. NMC commenced shutdown of Unit 2 on February 5, 2006.

EVENT ANALYSIS

Since Unit 2 was shut down in accordance with TS LCO 3.8.1, this event is required to be reported per 10 CFR 50.73(a)(2)(i)(A).

Impact on Safety System Functional Failure Performance Indicator

The bounding accident load for D6 is a station blackout (~3650 kW). The D6 Engine 1 crankcase pressure excursion occurred at a significantly higher load (between 5100 kW and 5300 kW) and crankcase pressure decreased when load was reduced (between 3800 kW and 4000 kW). This load dependency is consistent with all prior crankcase pressure excursions on D5 and D6. The team that investigated the as-found condition of D6 concluded there was reasonable assurance that D6 would have been able to provide the bounding accident load in the as-found condition without crankcase pressure elevating to the point it threatened engine operation. Therefore, the as-found condition does not represent a loss of safety function. Consequently, this event is not reportable per 10CFR 50.73(a)(2)(v).

¹ (EIS System Code: EK; EIS Component Identifier: DG)

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SAFETY SIGNIFICANCE

As noted above, there was reasonable assurance that D6 would have been able to provide the bounding accident load in the as-found condition without crankcase pressure elevating to the point it threatened engine operation. Therefore, this event did not affect the health and safety of the public.

CAUSE

The Unit 2 shutdown is a result of the D6 Engine 1 issue occurring during return to service testing following maintenance on Engine 2. Considering the time spent on D6 Engine 2 maintenance, the Technical Specification Completion Time for D6 being inoperable would have expired before repairs on Engine 1 could have been completed, thus, Unit 2 was shutdown as required by Technical Specifications. NMC conducted a Root Cause Evaluation (RCE) of the February 4, 2006, D6 crankcase pressure excursion. The equipment root cause was determined to be long-term, inadequate control of lube oil level in the engine crankcase. Prolonged operation with lube oil level too high:

- (1) adversely affected proper operation of the crankcase breather system,
- (2) adversely affected readings of the crankcase manometer,
- (3) increased lube oil carryover through the intake manifold as evidenced by oil in the under pressure regulator filter, and
- (4) increased lube oil deposits on the piston crowns and top lands.

Contributors to this cause include:

- (1) inappropriate setting of low lube oil level switch² causes over filling of crankcase,
- (2) the practice of routinely allowing engine operation with oil level above the maximum dipstick reading, and
- (3) less than adequate manometer connection to the crankcase that allows lube oil to fill the Tygon tubing affecting accuracy.

Two potential contributing causes were identified that require more detailed study were also identified:

- (1) Piston top ring "pinch" at high load operation – additional information (i.e., Finite Element analysis of UD45 piston to determine the effect of engine load on geometry of top ring groove) will be needed to support or refute this potential contributing cause, and
- (2) Breather system may not be fully capable of exhausting the crankcase when the crankcase lube oil level is at or above the maximum level.

Additionally, the root cause evaluation assessed the human performance and organizational factors that led to this event.

² (EISS Component Identifier: LS)

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

CORRECTIVE ACTION

Completed actions include:

1. Replaced all the cylinder liners and piston rings on D6 Engine 1 and Engine 2 (with the exception of the liners and rings that had just been replaced on the four cylinders on Engine 2). D6 was returned to operable status on February 16, 2006 after completing a return-to-service surveillance run.
2. Reduced normal operating band for lube oil levels in all D5/D6 engines to engineering recommended level. Indicating scribe lines on the engine dipsticks were modified to reflect the proper crankcase oil level.
3. Implemented control of the reduced oil level through procedure enhancement and training of operators.
4. The manometer connection was modified to prevent problems with oil getting into the manometer tubing.

Planned actions include:

5. Submit a License Amendment Request to reduce the load at which D5 and D6 must be tested in order to meet Technical Specification Surveillance Requirements.
6. A finite element analysis of the D5/D6 (UD45) piston design is being performed to determine definitively if ring-pinch is a significant contributor to the crankcase pressure excursion. Initial results indicate that the top ring groove does close at higher load, but the closure would not appear to cause a ring pinch unless combined with another issue (e.g., deposits).
7. A study to confirm the adequacy of the current breather system will be initiated.
8. In addition, corrective actions have been initiated to address the human performance and organizational root causes.

PREVIOUS SIMILAR EVENTS

Both trains of Unit 2 emergency diesel generators have had issues with crankcase pressure excursions in the past that led to a Unit 2 shutdown. Refer to Licensee Event Report (LER) 2-01-03 and LER 2-05-02.