



Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East • Welch MN 55089

October 1, 2001

10 CFR Part 50
Section 50.73

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket No. 50-306 License No. DPR-60

LER 2-01-03, Rev. 1: Technical Specification Required Shutdown of
Unit 2 Due to Declared Inoperability of Both Emergency Diesel Generators

A revised Licensee Event Report for this occurrence is attached. The changes are side-barred, they occur on pages 1 and 2 of the report. The original report inadvertently stated that parts removed in April and May had been sent to a laboratory for analysis when, in fact, only parts removed in May had been sent. In this revised report, we have made no new NRC commitments. Please contact us if you require additional information related to this event.

Mano Nazar
Site Vice President
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC
NRR Project Manager, NRC
Senior Resident Inspector, NRC
James Bernstein, State of Minnesota

Attachment

IE22

NRC FORM 366 (1-2001)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001 Estimated burden per response to comply with this mandatory information 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 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.						
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)										
FACILITY NAME (1) Prairie Island Nuclear Generating Plant Unit 2				DOCKET NUMBER (2) 05000 306			PAGE (3) 1 of 9			
TITLE (4) Technical Specification Required Shutdown of Unit 2 Due to Declared Inoperability of Both Emergency Diesel Generators										
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
05	09	01	01	- 03 -	01	10	01	01	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (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
				20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
				20.2203(a)(2)(iv)		✓ 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 Jack Leveille						TELEPHONE NUMBER (Include Area Code) 651-388-1121				
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	
SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).						✓ NO				
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)										
<p>At approximately 3:00 PM on May 9, 2001, Prairie Island personnel declared the Emergency Diesel Generators (EDGs) for Unit 2 (D5 and D6) inoperable based on a suspected lube oil/fuel oil incompatibility that had the potential for affecting the ability of the EDGs to perform their design basis safety functions. A Unit 2 shutdown was commenced at approximately 5:00 PM on May 9, 2001 pursuant to the Prairie Island Technical Specifications.</p> <p>Following the May 9, 2001 shutdown, Prairie Island personnel performed detailed inspections, surveillance testing, and maintenance on both D5 and D6, including replacing the lube oil with the type now recommended by the EDG vendor for use with the low sulfur fuel oil currently used at Prairie Island. An outside diesel expert was contracted to perform an investigation of the problems encountered on D6, including laboratory analyses of some replaced components.</p> <p>Upon completion of the inspections, maintenance, investigation, analyses, and surveillance testing, D5 and D6 were declared operable and Unit 2 was subsequently restarted (left Mode 5) on June 1, 2001. Subsequent analysis of the conditions of the EDGs versus the limiting design basis parameters concluded that the EDGs had been degraded but not inoperable.</p>										

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Prairie Island Nuclear Generating Plant Unit 2	05000 306	01 - 03 - 01			2 of 9

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

EVENT DESCRIPTION

At approximately 3:00 PM on May 9, 2001, Prairie Island personnel declared the Emergency Diesel Generators¹ (EDGs) for Unit 2 (D5 and D6) inoperable based on a suspected lube oil/fuel oil incompatibility that had the potential for affecting the ability of the EDGs to perform their design basis safety functions. A Unit 2 shutdown was commenced at approximately 5:00 PM on May 9, 2001 pursuant to the Prairie Island Technical Specifications.

The concern with a suspected lube oil/fuel oil incompatibility arose during a Prairie Island root cause investigation conducted regarding an elevated crankcase pressure problem encountered with D6 on April 9, 2001 (previously reported in LER 2-01-02). Specifically, as part of the root cause investigation, a re-assessment was initiated of external operating experience information regarding a 1996 incident at Calvert Cliffs involving EDGs from the same manufacturer (Wärtsilä SACM). Based on (1) an analysis of the Calvert Cliffs root cause report in light of the April D6 problems, (2) revised vendor information, and (3) a lack of any other clear cause(s) for the April D6 problem, operability of D5 and D6 was considered indeterminate and Prairie Island management declared D5 and D6 inoperable and subsequently shut down Unit 2 as required by Technical Specifications.

Following the May 9, 2001 shutdown, Prairie Island personnel performed detailed inspections, surveillance testing, and maintenance on both D5 and D6, including replacing the lube oil with a type compatible with the low sulfur fuel oil currently used at Prairie Island. An outside diesel expert (Ricardo, Inc.) was contracted to perform an investigation of the problems encountered on D6, including laboratory analyses of some replaced components.

Upon completion of the inspections, maintenance, investigation, analyses, and surveillance testing, D5 and D6 were declared operable and Unit 2 was subsequently restarted (left Mode 5) on June 1, 2001.

CAUSE OF THE EVENT

The cause of the event (a Technical Specification required shutdown of Unit 2) was the declared inoperability of D5 and D6 because of a suspected lube oil/fuel oil incompatibility. Prairie Island personnel determined, in the course of a root cause investigation, that the April 9, 2001 elevated crankcase pressure on D6 engine 2 caused by blow-by in one cylinder (E2B1) was likely attributable to a lube oil/fuel oil incompatibility similar to that experienced in 1996 at Calvert Cliffs. The Institute of Nuclear Power Operations (INPO) Operating Experience Report OE7869, issued in May 1996, for the Calvert Cliffs experience indicated that lube oil with additives designed for high sulfur fuel oil can cause deposits on pistons and rings of diesel engines that burn low sulfur fuel oil. This deposition was determined by Calvert Cliffs to be a potential degradation mechanism that could impact the operability of the affected EDGs.

¹ EIS Component Identifier: DG; EIS System Identifier: EK

NRC FORM 366A (1-2001)		U.S. NUCLEAR REGULATORY COMMISSION		
LICENSEE EVENT REPORT (LER)				
FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)		PAGE (3)
Prairie Island Nuclear Generating Plant Unit 2	05000 306	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
		01 - 03 - 01		
				3 of 9

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

The lube oil/fuel oil incompatibility issue raised by the Calvert Cliffs operating experience had been previously assessed by Prairie Island. In evaluating the applicability of the 1996 Calvert Cliffs operating experience to Prairie Island, correspondence with oil vendors and discussions with engine manufacturers took place. The Prairie Island external operating experience assessment (XOE 19960761, which evaluated INPO OE7869) concluded that there was no immediate action required for Prairie Island's D5 and D6 because (1) initial discussions (prior to the issuance of INPO OE7869) with the EDG vendor indicated that the vendor did not agree that the Calvert Cliffs problem resulted from lube oil/fuel oil incompatibility, (2) the sulfur content of the fuel oil in the storage tanks was higher than the level of concern, (3) no cylinder liner scuffing was noted on preventive maintenance (PM) inspections, and (4) Prairie Island used a different lube oil (mineral based versus synthetic) than was used at Calvert Cliffs.

An action item (APR 19960895) was opened to develop recommendations on future lube oils for the Prairie Island EDGs. This was closed in July 2000 with no change in lube oil or monitoring frequency. The decision to close the APR was an engineering decision which focused on the mechanical condition of the cylinder liners (extensive 5-year PMs had been performed on both D5 and D6 by that time). The conclusion was that although fuel oil sulfur content had decreased with addition of low sulfur fuel oil to existing inventories, discussions with lube oil vendors and engine manufacturers had indicated that the existing lube oils were satisfactory for use in older, cooler running engine designs (like D5 and D6) with low sulfur fuel oil. The evaluation noted that Prairie Island equipment monitoring and inspection had indicated no problems with the current lube oils. The five year PMs on D5 and D6 showed good cylinder liner and ring conditions. Surveillance data showed satisfactory crankcase pressure indicating no blow-by due to sticking rings.

Thus, Prairie Island closed the fuel oil/lube oil incompatibility issue in July of 2000 and it was not reconsidered until after the April 9, 2001 24-hour surveillance test of D6 was halted because of high crankcase pressure of D6 engine 2. Borescope inspection of all the cylinders on D6 engine 2 revealed scuffing of the cylinder liner and indication of blow-by in only cylinder B1 (E2B1). During the repair phase of the damaged cylinder liner and piston (once removed it was determined that there was some sticking of the top piston ring and deposits on the piston) the cause for the damage was being evaluated. A conclusive determination was not made but it was believed that the cause of the elevated crankcase pressure was isolated to the particular cylinder liner and piston. E2B1 had been operating at temperatures 80 degrees F higher than the other cylinders since September 1997 with no identifiable cause. Several unsuccessful attempts had been made in the past to reduce the cylinder temperature of E2B1. In addition, there was some consideration that there might be a connecting rod problem. The engine manufacturer, Wärtsilä SACM, representative inspected two pistons (both E2B1 and another, E2A1) and noted a higher than expected deposit buildup on the pistons for the number of hours on the engine. Following repairs, D6 was run for a break-in period of 11 hours and a 24 hour run, and then a borescope inspection was performed on E2 cylinders A1 and B1. Minor indications were observed on E2B1 but were considerably less than originally seen; there was no scuffing seen. In discussions regarding the slight indications, Wärtsilä SACM raised the potential lube oil/fuel oil incompatibility issue but could not explain why indications would be seen after so few hours and just in the one cylinder if the

NRC FORM 366A (1-2001)		U.S. NUCLEAR REGULATORY COMMISSION			
LICENSEE EVENT REPORT (LER)					
FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Prairie Island Nuclear Generating Plant Unit 2	05000 306	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 of 9
		01 - 03 - 01			

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

problem were oil incompatibility. Wärtsilä SACM recommended an additional 12 hour run and a repeat borescope inspection of cylinder E2B1. No changes in the indications were noted, engine cylinder temperatures were within 50 degrees F of one another and crankcase pressure was in the normal range. D6 was declared operable on April 17, 2001.

A condition report (CR 20013515) was initiated on April 18, 2001 to determine the causes for the apparently excessive repair time and to determine the cause of the cylinder scuffing and blow-by. The focus of the root cause team was divided between these two assessments and was originally concentrated on the repair time question. The potential for lube oil/fuel oil incompatibility at Prairie Island, viewed in light of the April D6 problems, suggested re-assessment of the 1996 Calvert Cliffs experience. On April 23, 2001, copies of the original INPO OE7869 on the Calvert Cliffs lube oil/fuel oil incompatibility issue were brought to the root cause team members by the team leader. Later that day, a copy of the Calvert Cliffs root cause evaluation was requested from Calvert Cliffs personnel. On April 25, 2001, the team discussed the possibility that the incompatibility issue may be applicable to the D6 problems. The Calvert Cliffs root cause evaluation report (along with an independent assessment by Ricardo, Inc.) was received at Prairie Island on April 30 and it was distributed at the May 2, 2001 team meeting but it was not discussed at that meeting. It was decided at that meeting to hire the same independent diesel engine expert which consulted at Calvert Cliffs (Ricardo) to assist in the root cause evaluation. On the afternoon of May 9, 2001 the team met to discuss the Calvert Cliffs root cause evaluation report. They re-assessed the Calvert Cliffs event for operability of D5 and D6. The conclusion of the re-assessment was that the operability of D5 and D6 was indeterminate. A determination was made that the diesel fuel and lubricating oils in the engines were probably incompatible, such that D5 and D6 may not be capable of long-term operation as required for mitigation of plant operational events. The root cause team informed plant management and the Duty Shift Manager declared D5 and D6 inoperable and Unit 2 was subsequently shut down as required by Technical Specifications.

Causes of this event were evaluated in two condition reports, one (CR 20014346) that investigated the mechanical causes of the event and one (CR 20014150) that investigated the organizational and programmatic causes of the event (specifically, with respect to the original assessment and closure of the 1996 operating experience assessment of the Calvert Cliffs event). An additional condition report (CR 20014237) addressed the possible effects of lube oil/fuel oil incompatibility on other site diesel engines.

Mechanical Causes

The root cause for increasing D6 engine crankcase pressure and associated crankcase blow-by was determined to be an incompatibility between the high Total Base Number (TBN) lube oil and the progressively decreasing sulfur content of the fuel oil. The sulfur in the fuel oil forms sulfuric acid during the combustion process and this acid is corrosive to the engine parts. Basic salts are used in lubricating oils to neutralize the sulfuric acid to reduce the corrosive effects. However, if the sulfur content is too low for the corresponding lube oil formulation, the basic salts can combine with uncombusted carbon to

NRC FORM 366A (1-2001)		U.S. NUCLEAR REGULATORY COMMISSION		
LICENSEE EVENT REPORT (LER)				
FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)		PAGE (3)
Prairie Island Nuclear Generating Plant Unit 2	05000 306	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
		01 - 03 - 01		
				5 of 9

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

create hard deposits on the piston. In the case of D6, the use of low sulfur fuel oil did not produce enough sulfuric acid during combustion to minimize the detergent salts from the lube oil and the remaining detergent salts from the lube oil did cause carbon deposits to become "hard packed" in the top land area of the piston. This deposition interfered with the normal movement of piston rings such that the piston rings did not seat properly against the cylinder liner, leading to blow-by experienced by D6 E2B1. Blow-by, in turn, led to the observed high crankcase pressure. Continued damage could lead to greater crankcase pressure, eventually causing an automatic shutdown of the engine on a high crankcase pressure signal, even though the machine could continue to function. Further damage could conceivably lead to binding of the piston in the cylinder and failure of the engine.

Organizational and Programmatic Causes

A root cause evaluation (CR 20014150) related to the original external operating experience evaluation (XOE 19960761) for the 1996 Calvert Cliffs event considered the initial screening of the external operating experience (XOE), the short-term and long-term actions recommended by the XOE assessment, and the decision-making process leading to the final disposition of the XOE. The root cause team has identified as root causes:

1. lack of a standard problem solving technique or standardized review methods for external operating events, and
2. lack of independent review of external operating events.

In addition, the root cause team identified as contributing causes:

1. lack of timely distribution of technical data by the diesel manufacturer,
2. non-independence of technical advice from lube oil vendors, and
3. ineffective program for monitoring of sulfur content in the fuel oil.

The evaluation concludes that a more effective assessment and disposition of this XOE and the subsequent action item (APR 19960895, issued to develop future recommendations for EDG oils) would have provided an effective monitoring method for sulfur content in fuel oils. This, in itself, would probably not have prevented the April 9, 2001 D6 cylinder and piston problems because the fuel oil sulfur content for D6 had not yet dropped below 0.05% (Wärtsilä SACM technical bulletin did not recommend switching to a different lube oil until that point.) But a more effective assessment would have likely avoided declaration of operability of D6 following the April repairs without full evaluation of the possibility of the damage being caused by fuel oil/lube oil incompatibility.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Prairie Island Nuclear Generating Plant Unit 2	05000 306	01 - 03 - 01			6 of 9

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

Extent of Condition with Respect to Other Site Diesel Engines

There is no indication that the lube oil/fuel oil incompatibility issue is applicable to the other diesel engines at Prairie Island. It is important to note that a particular TBN value and sulfur content do not by themselves cause incompatibility. The report from Ricardo (on its investigation on D5 and D6) states that engine piston ring design can prevent carbon deposit bore polishing, and concludes that incompatible fuel and lube oil combinations will cause carbon deposit packing only in a susceptible engine design. A review of industry operating experiences does not reveal any fuel oil/lube oil incompatibility problems related to these diesel engines.

Unit 1 Emergency Diesel Generators D1 and D2

The manufacturer (Fairbanks-Morse) reports that engines of similar design have been tested with fuel oils with sulfur content as low as 0.00%. The factory testing was performed with the same type of crankcase lube oil that is used at Prairie Island. The manufacturer has recommended no lower limit on sulfur content in fuel oil.

Surveillance testing and recent preventive maintenance inspection have indicated that D1 and D2 are not experiencing problems similar to those of D6. The latest PM inspection was made with the D6 problems in mind, visually inspecting the pistons, rings, and liners through the intake and exhaust ports.

Diesel-Driven Cooling Water Pumps 12 and 22

The manufacturer (Caterpillar) confirmed that the currently used lube oil is appropriate for use with fuel oils with sulfur content as low as 0.00%.

Surveillance testing and recent preventive maintenance inspection have indicated that the cooling water pump diesel engines are not experiencing problems similar to those of D6.

Non Safety-Related Engines

Evaluations concluded that there are no lube oil/fuel oil incompatibility concerns with the plant's non safety-related diesel engines.

ANALYSIS OF THE EVENT

The design basis for run times on D5 and D6 depends on the initiating event that they are required to mitigate (this discussion is based on action item (2DO 20015089, "Determine if a Safety System Functional Failure Resulted from the D5/D6 Lube Oil and Fuel Oil Incompatibility"). For initiating events where the operability of D5 could not be credited (e.g., design basis accidents where a single failure

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Prairie Island Nuclear Generating Plant Unit 2	05000 306	01 - 03 - 01			7 of 9

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

must be assumed or for an Appendix R fire where a fire affecting Unit 2 Train A safeguards electrical power must be tolerated), D6 would have to run. For these events, an Appendix R fire is the limiting initiating event and Appendix R, III.L.5 allows for reliance on offsite power following 72 hours. Thus, D6 would have to run for a maximum of 72 hours to mitigate the limiting initiating event.

For initiating events where D5 could be credited (e.g., external events where a concurrent single failure is not assumed as part of the Prairie Island design basis), D6 would not have to run at all to mitigate the postulated event, but either D5 or D6 or a combination of D5 and D6 would have to be able to run for a maximum of 21 days (504 hours) to mitigate the limiting initiating event. In these events, the maximum probable flood is the limiting initiating event. (USAR Section 2.4.3.5 states that, for the probable maximum flood, ". . . the flood stage would remain above 695 ft. for approximately 13 days.") When the flood exceeds an elevation of 695 ft., the unit transformers may be disabled. After the water recedes below the point of disabling the offsite source transformers, some time would be required to inspect and test the transformers before returning them to service. This would require EDG operation beyond 14 days and using a 3-5 day inspect, maintain, and clean duration, could put the EDG operating time near 19 days; adding two more days for margin establishes the 21-day time for EDG operation.)

Based on the Ricardo investigation and laboratory analyses and the root cause investigations, D6 was determined to be able to run for "several hundred hours" in the as-found conditions (on both April 9, 2001 and May 9, 2001):

"There was no immediate risk to the engine in its current condition. However over time (although not absolute, probably several hundred hours) the condition would have continued to worsen with repeated increases in blow-by and oil leaks from a pressurized crankcase. In addition, cylinder liner polishing would have continued through the abrasion mechanism of the hard carbon at the top ring position." (p.13 of Ricardo report dated May 23, 2001)

"The general condition of the engine, together with the quantitative results from the liner surface analysis, indicate the engine was in relatively good health and easily capable of many further hours of operation before mechanical failure occurred. The engine would have experienced increasing blow-by and oil leakage but would have taken some time before levels caused concern." (p. 27 of Ricardo report dated May 23, 2001)

D5, which (1) had substantially less run time since its last major overhaul, (2) had been operating on higher sulfur content fuel oil, and (3) had cylinder liners that were found to be in better condition, was expected to have been able to run for a much longer period in the as-found condition.

Two additional factors support the ability of D5 and D6 to operate for sustained runs of the required duration:

- The expected loadings for all initiating events are lower than the rated load of the EDGs (the rated load is 5400KW and the expected loadings are all less than 4000KW) and lower than the loading on D6 when it exhibited high crankcase pressure on April 9, 2001 (crankcase pressure is a function of

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Prairie Island Nuclear Generating Plant Unit 2	05000 306	01 - 03 - 01			8 of 9

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

load on the engine; when the load was reduced to 4000KW, the crankcase pressure went to zero), and

- Long, sustained runs of diesel engines are much less wear-inducing than multiple starts and short runs (because the majority of engine wear occurs on starting).

This event is reportable per 10CFR 50.73(a)(2)(i)(A) because Unit 2 was shut down as required by Technical Specifications. Even though subsequent investigations concluded that D5 and D6 would have been able to perform their design basis safety functions, they were declared inoperable on May 9, 2001, because their operability was judged indeterminate at that time and Unit 2 was shut down as required by Technical Specifications.

Loss Of Safety Function and Other Performance Indicator Impacts

With respect to loss of safety function, subsequent engineering evaluations (including the failure investigation and analyses of Ricardo) conclude that D5 and D6 would have run long enough in the as-found conditions (on either April 9, 2001 or May 9, 2001) to have been capable of performing their design basis safety function. Therefore, neither this event (the May 9, 2001 declaration of inoperability of both D5 and D6) nor the April 9, 2001 problem (the high crankcase pressure on D6, engine 2) represented a loss of safety function. Consequently this event is not reportable per 10CFR 50.73(a)(2)(v).

With respect to Safety System Unavailability for this event, per the guidance of NEI 99-02, Revision 0, time that either diesel was unavailable while Unit 2 was at cold shutdown is not counted. However, there was some time that D5 and D6 were unavailable before Unit 2 reached cold shutdown. Approximately 26 hours of unavailability for D5 and approximately 20 hours of unavailability for D6 will be counted. The April 9, 2001 event (reported in Unit 2 LER 01-02) involved unavailability of approximately 2 hours for D5 and approximately 206 hours for D6.

With respect to fault exposure time, in the as-found condition on April 9, 2001, D5 and D6 have been evaluated as capable of performing their design basis safety functions. This evaluation includes an assessment of whether a high crankcase pressure trip could have precluded D5 or D6 from performing their safety function. The 24-hour surveillance run of D6 on April 9, 2001, was manually terminated due to elevated crankcase pressure. D6 will trip on high crankcase pressure; however, this trip is bypassed by a Safety Injection (SI) signal. For those initiating events that would not produce an SI signal, it should be noted that the 24-hour surveillance was conducted at significantly higher load than is required to mitigate these initiating events. Test loads were between 5400 KW and 5940 KW when the high crankcase pressure occurred. When the load was reduced to 4000KW, the crankcase pressure went to zero. The non-safety injection accident analysis loadings are no greater than 3652 KW. At the analyzed loads for these initiating events, a crankcase pressure trip is considered to have been highly unlikely had the EDGs been called upon to mitigate one of these initiating events. Therefore, no fault exposure time is counted for either this event or the April 9, 2001 diesel problem.

NRC FORM 366A (1-2001)		U.S. NUCLEAR REGULATORY COMMISSION			
LICENSEE EVENT REPORT (LER)					
FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Prairie Island Nuclear Generating Plant Unit 2	05000 306	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	9 of 9
		01 - 03 - 01			

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

This event affects the number of unplanned power changes per 7,000 hours, but the unit has had 6 or fewer unplanned power changes in the last 7,000 hours.

Significance Determination

Since D5 and D6, while degraded, were evaluated to have been capable of performing their design basis safety functions in the as-found conditions (of either April 9, 2001 or May 9, 2001), this event is considered to be of very low risk significance.

CORRECTIVE ACTIONS

1. Maintenance, inspection, testing, and a lube oil change-out have been completed on both D5 and D6.
2. This event is captured in the Prairie Island Corrective Action process (in condition reports 20014346 and 20014150). These condition reports have recommended actions to prevent the recurrence of this event.
3. Condition report 20014237 through its related action item (2DO 20014619) has established actions to control the use of lube oil for differing sulfur contents of fuel oils for the various diesel engines at Prairie Island.

FAILED COMPONENT IDENTIFICATION

None. Although D5 and D6 were declared inoperable based upon a suspected degradation mechanism (i.e., deposition caused by lube oil incompatible with low sulfur fuel oil), and thus indeterminate condition, subsequent engineering evaluation indicates neither D5 nor D6 were in a failed condition such that they would have been prevented from fulfilling their design basis safety functions.

PREVIOUS SIMILAR EVENTS

The event reported in LER 2-01-02 is a precursor to this event.