



Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant
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August 14, 2001

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

Response to Special Investigation Team Inspection Report

Reference: G. Grant, Director, Division of Reactor Projects, to J. Sorensen, Site Vice President, PINGP, "Prairie Island Nuclear Generating Plant, Unit 2 NRC Special Inspection Report 50-306/01-13" (June 22, 2001).

NMC has been conducting a rigorous investigation into the facts and circumstances surrounding the problems experienced with the Prairie Island Nuclear Generating Plant (PINGP) Emergency Diesel Generators (EDGs) D5 and D6 in April and May of this year. Several PINGP root cause teams and an NRC Region III Special Investigation Team (SIT) investigated and analyzed relevant information. In addition, NMC formed a corporate-managed team working at the direction of outside counsel to independently gather and evaluate relevant information. As a part of this process, NMC has carefully compared the June 22, 2001, SIT Inspection Report (Reference) to its own information. Our review has identified discrepancies between the SIT Inspection Report and the NMC's understanding of the events. The purpose of this letter is to share those discrepancies and the basis for the NMC's corrections (see Attachment) to ensure that the NRC and NMC are working from a common understanding as any further reviews are undertaken.

In this letter, we make no new NRC commitments.

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Please contact Terry Pickens at (715) 377-3390 if you require additional information.

A handwritten signature in black ink, reading "Joel P. Sorensen". The signature is fluid and cursive, with the first name "Joel" being the most prominent.

Joel P. Sorensen
Site Vice President
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg

Attachment

ATTACHMENT

1. Cover letter, paragraph 4; Report, paragraph 1. Contrary to the statement at the beginning of the noted paragraphs, NMC had only established incompatibility between fuel oil and lube oil as the *most likely* cause of the observed problems at that time the D5/D6 Emergency Diesel Generators were declared inoperable on May 9. Evaluation of the high crankcase pressure caused by blow-by and the scuffing [polishing] of the cylinder wall were ongoing. The final report from the independent laboratory was received on May 23 and results of the Prairie Island root cause team investigating these problems was reviewed by the Operations Committee and approved by the Plant Manager on May 25.
2. Cover letter, page 1; Report, page 3. The SIT states that the D6 high crankcase pressure was caused by piston ring blow-by which also resulted in a scuffed cylinder. It is unlikely that blow-by caused the "scuffed" [polished] cylinder liner. As indicated on page 23 and 24 of the Ricardo Report¹, the most universally accepted cause for polishing is hard carbon packing on the top land which builds up to a level that contacts the bore at several times during the secondary motion of the piston. These impacts pack the carbon onto the top land in hard layers that eventually build up to a sufficient depth to touch the cylinder bore and cause polishing. Blow-by is caused when carbon build up causes the ring to stick in a position below the line of contact with the bore due to hammering from the secondary motion of the piston. The ring ceases to contact the bore wall, it does not form a pressure tight seal and the combustion gasses can no longer reach behind the ring to force it against the bore wall, thereby causing blow-by to occur. The conclusions on page 25 of the report support the conclusion that the blow-by was caused by sticking, stuck or intermittently sticking piston rings and that the pistons exhibited heavy top land carbon of a hard packed and polished nature, typical of a type that causes cylinder bore polishing. These are two separate phenomena caused by carbon build-up but, not caused by each other.
3. Cover letter, page 1. For clarity, it should be noted that the Unit 2 EDGs were declared inoperable on May 9, 2001, because the EDG's ability to perform their design basis functions was indeterminate (i.e., the Unit 2 EDGs were declared inoperable based on suspected lube oil/fuel oil incompatibility that had the potential for affecting the ability of the EDGs to perform their design basis safety functions).
4. Cover letter, page 2; Report, page 2. The basis for the statement that D5 and D6 "may also have been unavailable for additional time periods before the May shutdown" is not clear. Relative to the issues addressed in the SIT and during the timeframe of concern, neither EDG ever failed to start and run: the only indeterminate issue throughout the entire period was whether the engines would run long enough to perform their design basis functions.

¹ "Failure Investigation of Wartsila SACM UD45 V16 Diesel Engine at Prairie Island Nuclear Generating Plant," Ricardo Inc., May 23, 2001.

5. Report, page 3. For clarity, it is more accurate to state that PINGP operators manually tripped the turbine due to a condenser vacuum differential pressure, which resulted in an automatic reactor trip.
6. Report, page 4. The 05/26/96 and 01/03/00 entries regarding reasons why generic industry communications on Calvert Cliffs problems did not represent an immediate concern to PINGP personnel omitted the key fact that Calvert Cliffs EDGs used a different type of lube oil (*i.e.*, synthetic versus mineral-based), which was a significant consideration in the PINGP analysis. The PINGP interviewees recall discussing this issue with SIT investigators. This comment also applies to the discussion in the first complete paragraph on page 8.
7. Report, page 5. The 02/12/01 entry is misleading. The PINGP personnel observing the surveillance believed that a *fuel oil fitting* was leaking and wrote a work order to repair the source of the leak. It was determined not to be a high priority item and was scheduled to be completed during the March surveillance. Due to emerging work and scheduling needs the maintenance personnel assigned were not available to complete the work during the March surveillance. The work order was postponed and completed during the April surveillance test. Upon completion of the work order during the April surveillance test it was determined that it was not a fuel oil leak, but rather lube oil was blowing by the crankshaft seal due to high crankcase pressure.
8. Report, page 6. The second paragraph of the 04/17/01 entry should state that the PINGP staff took steps to provide the EDG vendor with existing fuel oil sample *information*. No new samples of fuel oil or lube oil were obtained at this time.
9. Report, pages 6 and 14. The 04/20/01 entry on page 6 and the discussion in the third paragraph on page 14 regarding receipt of the 1996 Calvert Cliffs Root Cause Report is incorrect as to the date. Based on NMC's investigation, including in-depth interviews with the system engineer requesting and receiving the report, the correct date is April 30, 2001. April 30 is supported by the consistent sequence of events recalled by other personnel involved in the matter and documentary evidence. A copy of the BG&E Calvert Cliffs EDG Operating Experience ("OE") report (INPO OE 7807, later superseded by INPO OE 7869) was retrieved from the site issues tracking system and was distributed to the PINGP root cause team investigating the D6 problem on April 23. Later on April 23, a system engineer was assigned to, and did, call an individual at Calvert Cliffs and requested a telefaxed copy of the Calvert Cliffs Root Cause Report. A message was subsequently received from Calvert Cliffs that the report, because of its size, would be sent by Federal Express instead of being tele-faxed. The report was sent via Federal Express on April 25 and received in the warehouse at the Prairie Island site on April 26th at 10:43 AM. This was confirmed via the Federal Express tracking system. The Federal Express package was routed from the warehouse to the system engineer's mailbox through the on-site mail. The system engineer departed the site at 11 AM on the 27th for

personal time off and returned on-site on the 30th. The Federal Express package had not reached the system engineer's mailbox prior to his departure at 11 AM on April 27th. Therefore, the Root Cause Report was not actually received by the system engineer until the following Monday (April 30th) and was distributed to the PINGP root cause team on May 2nd. The Calvert Cliffs Root Cause Report, which included a copy of an analysis by Ricardo Laboratories, led to a PINGP request for assistance from this independent laboratory later on May 2nd. The system engineer understands that his earlier belief that he received the Calvert Cliffs Root Cause Report on April 19th or 20th was an incorrect recollection.

10. Report, Page 6. The 04/30/01 entry is inaccurate as written. The system engineer received a copy of Calvert Cliffs Root Cause Report which included a copy of an independent laboratory technical report.
11. Report, pages 6-7. The 05/08/01 entry is incorrect as written. First, on May 8, 2001, the root cause team decided only that it could not assure that the EDGs could perform their design basis functions for the required period (*i.e.*, that operability was "indeterminate"). Second, when the general superintendent of engineering was informed, he did not give "the team 24 hours to make the operability decision." He directed the root cause team to complete its operability analysis consistent with the safety significance of the issue, which he believed required informing Operations of the status of the EDGs within a period of no longer than 24 hours or when a final conclusion was reached, whichever occurred first. Finally, an "operability decision" could not be made by the root cause team or the general superintendent of engineering in any event, as final operability determinations are performed by responsible licensed personnel.
12. Report, page 7. For clarity, the "April inspections" should be the "April 10th inspections" as more than one such inspection was performed in April 2001.
13. Report, page 9. The discussion of data "trends" is misleading. PINGP was not comparing fuel oil sulfur content and EDG crankcase pressure readings before this event, so it is not accurate to state that the trends were "not noticed" by PINGP. While high crankcase pressures were experienced in March and April 2001 the recorded pressures in previous months were within normal ranges. The significance of trends or differences in pressure readings within the normal range are not meaningful relative to fuel oil sulfur content. Many conditions can impact crankcase pressure, for example major engine overhauls and adjustments to the breather element. Trends of the D5 engines' crankcase pressures showed no similar correlation of increasing crankcase pressures to decreasing fuel oil sulfur contents. The "trends" discussed in the report simply could not have identified the piston ring blow-by that initiated the corrective action for this event.

14. Report, page 10. PINGP objects to the suggestion in the third paragraph that PINGP returned EDG D6 to operable status without adequate basis. To the contrary, PINGP had replaced the known defective parts, had determined no definitive cause that was limiting the ability of the EDGs to perform their intended safety functions, and performed all surveillance tests required by Technical Specifications before declaring the machine operable. There is no legal, regulatory, or licensing requirement to identify root causes of problems before an operability declaration.
15. Report, page 14. Two PINGP personnel recall the EDG vendor representative discussing the *possibility* of fuel oil and lube oil incompatibility, *along with a number of other potential causes*, during the period described. At the time, this potential cause was not considered likely because of the isolated nature of the problem (limited to one cylinder operating at an elevated temperature) and a lack of specific information regarding the Calvert Cliffs event, which was not available to the personnel involved at the time.
16. Report, page 14. The document requests made by the SIT, in hindsight, could not have reasonably been fulfilled in the short period of time allotted by the team and PINGP personnel should have asked either for more time or a narrower scope. The PINGP response, however, was reasonable and responsive under the circumstances. Furthermore, obtaining "any relevant system engineer notes and e-mails" within two days was unrealistic, particularly when the EDG system engineers were fully involved in repairing the EDGs. In any event, NMC questions the relevance and usefulness of reliance on such informal and inherently unreliable documents as e-mails and hand-written notes as a basis for regulatory compliance decisions.