

Washington Public Power Supply System

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REGION V IIR

October 5, 1984
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Responds to: N/A
Response required by: N/A

Mr. J.B. Martin
Regional Administrator
Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596

Subject: NUCLEAR PROJECTS NOS. 1 AND 4
DOCKET NOS. 50-460 AND 50-513
REPORTABLE CONDITION 10CFR50.55(e)
EMERGENCY DIESEL GENERATOR TURBOCHARGER
THRUST BEARING LUBRICATION

References: A) Telecon, C.R. Edwards, Supply System, to R.T. Dodds, NRC,
same subject, dated March 7, 1984
B) G01-84-0101, letter R.W. Root, Supply System, to J.B.
Martin, NRC, same subject, dated April 6, 1984.

In Reference A, the Supply System informed your office of a reportable deficiency in accordance with the requirements of 10CFR50.55(e). Reference B was an interim response on the subject deficiency.

With regard to the two Delaval diesel generators at WNP-4, one has been sold to a non-nuclear utility and the other has been downgraded to a commercial grade status and will not be sold for a nuclear safety application. Therefore, this report and subsequent correspondence associated with the Emergency Diesel Generators will only address the WNP-1 units.

Attachment A has been updated since Reference B was issued to define the specific corrective actions to be implemented. Based on the current construction status at WNP-1, the Supply System will not be able to issue a final report at this time. An update will be provided at construction restart.

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Mr. J.B. Martin
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If you have any questions or desire further information, please advise.



R.W. Root, Jr.
WNP-1 Program Director (821)

RWR/LCO/cjh

Attachments

cc: JP Laspa, BPC 862
V Mani, UE&C 899
EC Haren, UE&C 895
NRC Document Control Desk
ORM 847
FDCC 899
BDCC 828

ATTACHMENT A

DOCKET NO. 50-460 REPORTABLE CONDITION PER 10CFR50.55(e) EMERGENCY DIESEL GENERATOR TURBOCHARGER THRUST BEARING LUBRICATION

Description of Deficiency

The Supply system purchased two emergency diesel generators for WNP-1 from Transamerica Delaval Inc. (TDI). TDI has reported under the requirements of 10CFR Part 21, a deficiency associated with the design for turbocharger thrust bearing lubrication. There is one turbocharger per engine, manufactured by the Elliott Company of Jeanette, Pennsylvania. They are installed on the engines by Delaval and lubricated in accordance with Elliott Company recommendations.

The defect exists in the lubricating oil system that supplies oil to the turbocharger bearings. The oil seal of the turbocharger is a labyrinth type seal and is only effective when the turbocharger is running.

The lubrication problem occurs when the engine generators are in the standby mode. The pre-lube system provides lubrication to the critical components during this period. The flow of oil is reduced to the turbocharger to prevent excess oil from entering the intake or combustion air system. Once the engine starts, and the main lube system is up to pressure, adequate lube oil is provided. The insufficient lubrication of the turbocharger thrust bearing only occurs on a quick start after a prolonged period in the standby mode. Turbocharger thrust bearing failure occurs only after many quick starts.

This was also the subject of a previous 10CFR Part 21 Report by Transamerica Delaval dated December 16, 1980. The Supply System prepared and approved this design improvement as recommended by Delaval and implementation was in progress when plant construction was halted in May 1982. This recommended system modification has apparently not corrected the problem at other sites.

Analysis of Safety Implication

The previous 10CFR Part 21 was considered a product improvement based on information provided by TDI. Based on the more recent Part 21 report, it was determined that this defect cannot be treated as a product improvement. As a result, premature, rapid wear of the thrust bearings must be corrected. If this system defect is not corrected, engine availability could be affected.

Cause of Deficiency

Turbocharger thrust bearings experience rapid wear because of the unique operations of nuclear standby engines. The periodic testing required to ensure engine availability is a unique requirement of the nuclear industry and apparently has not been accounted for by the turbocharger manufacturer or the diesel engine supplier.

Corrective Action

In 1981, the Supply System issued a design change to install a drip lubrication system as recommended by Delaval. As this fix did not resolve the problem, the Supply System will implement the recommendations of the TDI Diesel Generator Owner's Group which reviewed the turbocharger thrust bearings.

- Operating procedures will be revised to use the auxiliary lube oil pump for prelube of the turbocharger bearings. Auxiliary lube oil pump flow will be initiated prior to engine starting and stopped when full oil pressure is obtained. Additionally, the auxiliary lube oil pump will be used during roll down.
- The TDI recommended drip lubrication system will be retained for minimizing thrust bearing wear associated with automatic fast starts. The quantity of oil passing through the turbocharger shall be at least 0.1 gph.
- For improved confidence in the reliability of the turbocharger, inspection of a thrust bearing for signs of excessive wear will be performed to verify the adequacy of the full flow prelube system. This inspection shall be performed on a thrust bearing following an initial 100 engine starts or at the closest plant refueling outage but not to exceed 130 starts.
- Since the nuclear standby diesel generator sets may undergo automatic fast starts not associated with a potential LOOP/LOCA event, the turbocharger thrust bearings of each WNP-1 engine will be inspected for excessive wear and, if necessary, replaced after experiencing no more than 40 such starts. This inspection/replacement is applicable to all thrust bearings installed.
- The turbocharger rotor axial clearances will be checked prior to startup to ensure that they meet current TDI recommendations. In addition, the rotor axial clearance will be routinely checked in accordance with the TDI instruction manual. Since trends of increasing clearance could signify thrust bearing degradation (even if the total displacement is within specification), any such trends will also be reviewed.
- Spectrochemical engine oil analysis has recently been incorporated into the TDI Instruction Manual. To further expand the preventive monitoring of the turbocharger thrust bearing, ferrographic engine oil analysis may be utilized as copper level and particulate size could signify thrust bearing degradation.

Based on the current construction status at WNP-1, the drip system has not been installed and the remaining recommendations will not be implemented until after construction restart.

Action to Prevent Recurrence

Implementation of the corrective actions will ensure availability of the turbocharger through proper lubrication of the thrust bearings. To ensure licensability of the Delaval diesel engines and auxiliaries, the Supply System is currently participating as a member of the TDI Diesel Generator Owners Group.