

JUN 06 2003



LRN-03-0239

United States Nuclear Regulatory Commission  
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Washington, DC 20555

**REPLY TO NOTICE OF VIOLATION – EA-03-070  
INSPECTION REPORT 50-272/02-010 & 50-311/02-010  
SALEM GENERATING STATION UNITS 1 AND 2  
FACILITY OPERATING LICENSES DPR-70 AND DPR-75  
DOCKET NOS. 50-272 AND 50-311**

Pursuant to the provisions of 10CFR2.201, PSEG Nuclear LLC (PSEG) provides the attached information in response to the Notice of Violation issued on May 1, 2003, in Salem Inspection Report 50-272/02-010 and 50-311/02-010. The NRC has determined that the failure to preclude repetition of the EDG turbocharger failures is a violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions.

Attachment 1 provides the reply to Notice of Violation EA-03-070. Attachment 2 provides a summary of the regulatory commitments made in this submittal.

On October 15, 2002, PSEG identified a negative trend in ineffective corrective action. Issues impacting safety system performance, industrial safety, equipment reliability and generation were identified. The repetitive nature of the issues indicated that corrective actions were not addressing the causes.

The root cause was attributed to ineffective Performance Improvement Process implementation. Contributors to repeat issues indicate that increased management involvement in activities and decisions that impact corrective action effectiveness are needed to prevent repeat issues. Contributing causes were attributed to over-reliance on apparent cause evaluations and Performance Improvement Process design deficiencies that do not provide focus on corrective action effectiveness.

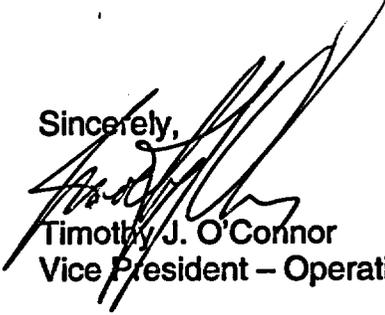
Corrective actions were identified to establish management control over key process steps including expectations for the use of apparent cause evaluations, revising the Performance Improvement Process and revising the site corrective action performance indicators.

IE14  
95-2168 REV. 7/99

JUN 06 2003

If you have questions regarding the information in this submittal, please contact Michael Mosier at 856-339-5434.

Sincerely,



Timothy J. O'Connor  
Vice President – Operations

Attachments (2)

**JUN 06 2003**

**C Mr. H. Miller, Administrator – Region I  
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**Attachment 1  
Reply to Notice of Violation  
EA-03-070**

During an NRC inspection conducted between September 16, 2002 - January 30, 2003, the results of which were discussed at an exit meeting on January 30, 2003, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

10 CFR 50 Appendix B, Criterion XVI, states, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.

Contrary to the above, in 1990 and 1998, significant conditions adverse to quality were identified involving emergency diesel generator turbocharger compressor failures for two of the six emergency diesel generators, and the licensee did not take appropriate corrective actions to preclude repetition, as evidenced by the following examples:

1. After a failure in 1990 of the 2B EDG turbocharger because of a compressor end blade failure, corrective actions were developed to perform non-destructive examination (NDE) of turbocharger rotating elements every four refueling outages; however, this NDE was never scheduled or conducted; and
2. After a failure in 1998 of the 2A EDG turbocharger, although action was initiated to perform vibration monitoring of the turbochargers, this action was not effective in that no action levels for evaluating and mitigating increased vibration were established. In addition, due to the manner in which vibration data was collected, the licensee was unable to perform trending of the data to identify degrading turbocharger conditions.

Subsequently, the 1C EDG turbocharger failed on September 13, 2002, because of a fatigue induced failure of a compressor blade.

**RESPONSE:**

PSEG Nuclear LLC (PSEG) concurs with the violation.

**(1) The reason for the violation**

Fatigue failures of turbine blades occurred in 1977 and 1998. The corrective action for the 1977 turbine blade failure was redesign of the blades by the original equipment manufacturer (OEM). PSEG believes that this corrective action was adequate to

**Attachment 1  
Reply to Notice of Violation  
EA-03-070**

prevent recurrence. However, PSEG subsequently selected a non-OEM vendor to refurbish the turbochargers. That vendor used non-OEM turbine blades. The cause of the 1998 turbine blade failure was the use of non-OEM blades. The failures in 1990 and 2002 involved inducer blades. Investigation into the 2002 turbocharger inducer blade crack initiator and/or the cause of the fatigue failure is still in progress. Periodic NDE of the inducer blades should detect cracks and allow for replacement of the turbocharger prior to blade failure.

After the 1990 inducer blade failure, the preventive maintenance (PM) program was changed to perform NDE of the turbocharger inducer blades every 4 refueling outages. The turbochargers for all six-diesel generators were replaced, or underwent NDE examination at least once every 4 refueling outages between 1990 and 1999. NDE should have been performed on the 1C turbocharger during the refueling outage in 1999, but was not. In 1999 the PM program was revised to delete the requirement for NDE every 4 refueling outages, and to add replacing and refurbishing turbochargers each 8 refuelings, which was consistent with the vendor recommendation. The most likely cause of the 1C EDG in 2002 failure was deleting the inducer blade NDE without adequate technical justification.

Vibration data on the Salem turbochargers is captured and analyzed as part of a routine predictive maintenance program that is similar to that used by many in the industry. The purpose of the vibration analysis program is to detect the most common problems such as mass imbalance, bearing misalignment, bearing looseness, and excessive bearing clearance. Rotor imbalance problems were identified in 1999 and 2001 that were addressed before they resulted in turbocharger failure.

**(2) The corrective steps that have been taken and results achieved**

All turbochargers with non-OEM turbine blades have been replaced. The spare turbocharger currently onsite has been overhauled by the OEM using OEM or OEM approved parts. The OEM is currently overhauling the other two spares. Supplier requirements for turbochargers are in the materials management system to specify that all repairs are to be performed by the OEM and that reverse engineered parts are not to be used. The receipt inspection process will verify that the purchase specifications are met.

NDE has been performed on five of the six EDG turbochargers. There have been no indications of cracking. The NDE inspection of the 1B turbocharger that was replaced in 2001 has been scheduled (see item (3)).

PM activities have been created to perform NDE inspections on EDG turbocharger inducers every 18 months. Additional management oversight to assure that the frequency will not be changed will be provided through the commitment management program.

**Attachment 1  
Reply to Notice of Violation  
EA-03-070**

**(3) The corrective steps that will be taken to avoid further violations**

The following corrective actions will be taken to prevent further violations:

- a. The vibration-monitoring program will be enhanced to adequately address action levels for evaluating and mitigating increased vibration and to perform trending of the data to identify degrading turbocharger conditions. These enhancements will be associated with problems such as mass imbalance, bearing misalignment, bearing looseness, and excessive bearing clearance.  
**Completion date: September 1, 2003**
- b. Testing of a spare turbocharger and additional instrumentation of onsite endurance runs will be performed to determine the inducer blade crack initiator and/or what is causing the fatigue failure.
- c. NDE will be performed on the 1B EDG prior to the next 24-hour endurance run.

**(4) The date when full compliance will be achieved**

Full compliance was achieved upon completion of item (2) above.

**Attachment 2  
List of Regulatory Commitments**

The following table identifies those actions committed to by PSEG in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

<p>The vibration-monitoring program will be enhanced to adequately address action levels for evaluating and mitigating increased vibration and to perform trending of the data to identify degrading turbocharger conditions. These enhancements will be associated with problems such as mass imbalance, bearing misalignment, bearing looseness, and excessive bearing clearance.</p>	<p><b>Completion date: September 1, 2003</b></p>
<p><b>NDE will be performed on the 1B EDG prior to the next 24-hour endurance run.</b></p>	<p><b>Completion date: Prior to the next 24 hour endurance run</b></p>
<p><b>Perform NDE inspections on EDG turbocharger inducers every 18 months.</b></p>	