



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038
Salem Generating Station

June 13, 1990

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

Dear Sir:

SALEM GENERATING STATION
LICENSE NO. DPR-75
DOCKET NO. 50-311
UNIT NO. 2
SPECIAL REPORT 90-6

This Special Report addresses the circumstances surrounding the valid failure of Nos. 2A and 2B Diesel Generators on May 18, 1990 and May 21, 1990 respectively. This report is submitted in accordance with the requirements of Technical Specification Surveillance 4.8.1.1.4. It is being submitted within thirty (30) days as per the Action Statement.

Sincerely yours,

L. K. Miller
General Manager -
Salem Operations

MJP:pc

Distribution

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PLANT IDENTIFICATION:

Salem Generating Station - Unit 2
Public Service Electric & Gas Company
Hancock's Bridge, New Jersey 08038

IDENTIFICATION OF OCCURRENCE:

2A Diesel Generator and 2B Diesel Generator valid failures both due to equipment failure

Event Date(s): 5/18/90 and 5/21/90

Report Date: 6/13/90

This report was initiated by Incident Report Nos. 90-322 and 90-330.

This special report describes two (2) valid test failures. One involving 2A Diesel Generator (D/G) occurring on May 18, 1990 and the other involving 2B D/G occurring on May 21, 1990. This report is submitted for informational purposes in accordance with Technical Specification Surveillance Requirement 4.8.1.1.4 and contains the information required by Regulatory Guide 1.108, Revision 1, August 1977, Regulatory Position C.3.b.

Surveillance Requirement 4.8.1.1.4 states:

All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.1.

CONDITIONS PRIOR TO OCCURRENCE:

Mode 6 (Refueling)

DESCRIPTION OF OCCURRENCE:

On May 18, 1990 at 0832 hours, a jacket water leak developed on a threaded connection to the 2A D/G turbocharger during a twenty-four (24) hour loaded surveillance run, being performed in accordance with Surveillance Procedure SP(O) 4.8.1.1.2C7A, "2A Diesel Generator Endurance Run and Load Rejection Test". Subsequently, the D/G was declared inoperable.

On May 21, 1990 at 1730 hours, a jacket water leak developed on the 2B D/G jacket water vent piping during a twenty-four (24) hour loaded surveillance run being performed in accordance with Surveillance Procedure SP(O) 4.8.1.1.2C7B, "2B Diesel Generator Endurance Run and Load Rejection Test". The 2A D/G repairs associated with the failure above had been completed and the D/G declared operable prior to the 2B D/G failure.

APPARENT CAUSE OF OCCURRENCE:

The cause of the 2A D/G valid test failure has been attributed to an equipment failure. A 3/4" NPT nipple, approximately 2 inches long, had loosened in the block fitting to the main jacket water header. The cause of the nipple loosening has been attributed to vibration induced movement. Although the leakage was within the make-up system

APPARENT CAUSE OF OCCURRENCE: (cont'd)

capability and operations could have continued, the D/G surveillance was terminated and the D/G was declared inoperable to allow immediate repair.

The cause of the 2B D/G valid test failure has been attributed to an equipment failure. A 3/8" NPT nipple, approximately 2 inches long, cracked in the root of a thread. The cause of the crack has been attributed to vibration induced fatigue. The cracked fitting did not fail catastrophically. Although the leakage was within the make-up system capability and operations could have continued, the D/G surveillance was terminated and the D/G was declared inoperable to allow immediate repair.

ANALYSIS OF OCCURRENCE:

The failure of both D/G fittings created leakage of chromated water which is a hazardous material. The D/G was removed from service, prior to completion of the surveillance, to mitigate the consequences of the leakage.

The 2A D/G water leaked onto various equipment including: the crank case oil Hi/Lo level alarm and the jacket water pressure switches. This equipment was checked and it was determined that they were unaffected by the leakage.

No material failure was realized on 2A D/G; therefore, no further analysis of the 2A D/G failure is required. The thread loosening is considered an isolated event.

The 2B D/G water leaked onto various equipment including: the crank case overpressure alarm; the turbo boost solenoid valve; miscellaneous oil temperature controller and indications; and the prelube pump. This equipment was checked and it was determined that they were unaffected by the leakage.

A review of historical records indicates that the 2B D/G failure has occurred previously. Salem Unit 1 1B D/G had the same nipple leakage in May 1988 and 2B D/G had a similar leak in September 1989. It has not been determined that vibration fatigue is the only failure mechanism. Installation torquing may also contribute to failure. Schedule 80 wall thickness nipples were installed replacing the original equipment manufacturers schedule 40 in accordance with the Salem Generating Station piping specifications. Metallurgical analysis of the failed 3/8" nipple is expected to be complete June 1990.

The 2A D/G and 2B D/G jacket water leaks during surveillance testing, constitute valid test failures as described in Regulatory Guide 1.108. These were the fourth and fifth D/G failures in the last 100 starts for all three (3) D/G's. The last 100 valid tests performed date back to March 21, 1989. The other failures included: a valid failure of 2B D/G, occurring on September 9, 1989, (reference Special Report 311/89-3) due to a Jacket Water leak on the turbo boost unit; a valid failure of 2C D/G, occurring on January 9, 1990, (reference Special Report 311/90-1) due to the failure of its Woodward Governor; and a valid failure of 2B D/G, occurring on May 2, 1990 (reference

ANALYSIS OF OCCURRENCE: (cont'd)

Special Report 311/90-5), due to the failure of the turbocharger to allow full loading of the D/G.

In Mode 6, Technical Specifications require only two (2) operable D/Gs. During these events, the other D/Gs remained operable. Therefore, this event did not impact the health and safety of the general public.

CORRECTIVE ACTION:

The 2A D/G 3/4" NPT nipple has a tapered thread. The threads loosened and allowed leakage. No pipe dope was evident on the original threads. The leaking nipple was original equipment. The lack of pipe dope and vibration effects may have contributed. A new nipple in kind was installed in accordance with standard maintenance work practice.

The 2B D/G cracked nipple was replaced with a Schedule 80 nipple in accordance with the Salem Generating Station piping specifications. The failed nipple has been submitted for metallurgical analysis to confirm mode of failure.


Engineering is continuing its review of the D/G turbo boost jacket water vent piping configuration for minor design modifications to reduce the risk of vibration induced failures. Long term corrective action will be based upon results of the metallurgical evaluation(s).

The other D/Gs (both Unit 1 and Unit 2) jacket water vent piping configurations were inspected. No other fittings were found to require replacement.

The chromated water was cleaned from where it had leaked.

The surveillance frequency has been increased to once every three days due to the number of failures in the last 100 starts, as required by Technical Specification 3.8.1.1.

The systematic analysis of failure modes and affects for the D/Gs is included in the Reliability Centered Maintenance program currently underway. This will further enhance D/G reliability.


General Manager -
Salem Operations

MJP:pc

SORC Mtg. 90-069