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1985 MAY 31 AM 11:09
ANPP-32736-EEVB/WFQ
May 25, 1985
REGION V I&E

Mr. John B. Martin, Regional Administrator
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596-5368

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Special Report - Diesel Generator Failure
Docket No. STN 50-528, License No. NPF-34
File: 85-056-026; G.1.01.10

Dear Mr. Martin:

Attached please find a Special Report prepared and submitted pursuant to Specifications 4.8.1.1.3 and 6.9.2 of Appendix A (Technical Specifications) to the Palo Verde Nuclear Generating Station, Unit No. 1 Operating License. This report discusses diesel generator failures.

If you have any questions or concerns, please contact me.

Very truly yours,

E. E. Van Brunt, Jr.
Executive Vice President
Project Director

EEVB/GEC/slh
Attachments

cc: R. P. Zimmerman
E. A. Licitra
A. C. Gehr
INPO Records Center

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PALO VERDE NUCLEAR GENERATING STATION UNIT 1

SPECIAL REPORT

DIESEL GENERATOR FAILURE AS PER TECHNICAL SPECIFICATIONS

Docket No. STN 50-528

License No. NPF-34

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT

1155 EAST 58TH STREET, CHICAGO, ILL. 60637

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On April 25, 1985, at 1400 with Unit 1 in Mode 4, Diesel Generator "A" was determined inoperable due to a start failure while Operations Engineering was testing an oscillographic device under Work Order 84387. This start failure was the second (2nd) failure (on a per nuclear unit basis) in eleven (11) valid tests, requiring Unit 1 to comply with Technical Specification Table 4.8-1 and Regulatory Guide 1.108.C.2.d.(2).

A strip chart recorder, used for surveillance testing, monitored Diesel Generator "A" parameters during the start failure. Subsequent chart analysis showed the engine cranked satisfactorily but apparently the fuel racks (mechanical linkage that controls fuel supply to the diesel generator injectors) never opened to supply fuel to the engine before tripping on "Incomplete Sequence" at 15 seconds.

At 1758 on April 25, 1985, a troubleshooting start attempt was performed on Unit 1 Diesel Generator "A" after no cause could be found for the start failure. The Diesel Generator started and came up to rated voltage, frequency, and speed, normally. Analysis of the recorder chart confirmed that the start was normal except for a slightly slower start time, which was attributed to only one air receiver being in service due to a surveillance test requirement. Troubleshooting continued throughout the night of April 25, 1985, and the morning of April 26, 1985, but the fuel rack failure could not be repeated after numerous simulated start initiations. Another troubleshooting start attempt was performed at 0620 on April 26, 1985, with Diesel Generator "A" starting and coming up to rated voltage, frequency, and speed, normally.

Work Order 85140 was initiated to lubricate the Diesel Generator "A" fuel racks and Work Order 85135 was initiated to clean the Diesel Generator "A" starting air control air filters and change the control governor actuator oil. During the performance of the work orders, it was noted by Engineering that oil was present in the starting air and control air system and a residue which appeared to be "Cosmoline" was collecting on the starting air header filters. Engineering also noted that a black "gummy" substance was being deposited on the fuel rack pneumatic control cylinder shaft which would inhibit its motion and thereby restrict fuel rack movement. The conditions noted were also apparent on Diesel Generator "B".

After reviewing the control cylinder design, Engineering's evaluation of the observed conditions was that the oil in the control air systems was apparently causing deterioration of the O-ring that seats on the control cylinder shaft. The deteriorating O-ring was leaving the deposit on the shaft and actually bonding to the shaft during the 2 to 4 week period between engine starts for surveillance testing. The fuel rack failure could not be repeated because after being exercised, the O-ring to shaft bond was broken and the cylinder shaft appeared to be operating normally, although visibly more sluggish than usual.

The work orders were completed and the fuel rack cylinder shaft thoroughly cleaned prior to a troubleshooting start attempt performed on April 27, 1985 at 1748. All conditions and parameters appeared normal during the test start resulting in Surveillance Test 41ST-1DG01 being performed on April 27, 1985, at 1854 with all acceptance criteria satisfied. The Unit 1 Diesel Generator "A" was determined operable on April 27, 1985, at 2014 after having been inoperable for 54 hours and 14 minutes.

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Cooper Energy Services, the Diesel Generator Supplier, was contacted on April 29, 1985, regarding the presence of oil in the control and starting air systems and the apparent deterioration of the fuel rack control cylinder shaft O-ring. They confirmed that oil should not be present in the air system and, since the O-ring material is Buna-N (natural rubber), oil would cause it to deteriorate.

The following corrective action has been undertaken:

1. Inspection and Preventative Maintenance of the Diesel Generator air system filters at regular intervals by addition of new requirements to existing procedures and programs.
2. With vendor support, determine the source of the oil in the air system and correct it. Clean up the air system as necessary to return the system to normal.
3. Obtain, test and install new fuel rack control cylinders in Unit 1 Diesel Generators "A" and "B". As an interim measure until the control cylinders are replaced, the fuel racks will be exercised daily per PCN004 to 41ST-1ZZ16 to ensure system operability.
4. Evaluate replacing the Buna-N O-ring in the fuel rack control cylinders with an oil resistant material.

