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JOSEPH A. TIERNAN
VICE PRESIDENT
NUCLEAR ENERGY

January 11, 1987

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Reply to NRC Inspection Report Nos. 50-317/87-23; 50-318/87-25

Gentlemen:

The subject inspection report identified one item of apparent non-compliance with NRC requirements. Enclosure (1) to this letter is our reply to the Notice of Violation.

Should you have any questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

JAT/SRC/dlm

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
R. A. Capra, NRC
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ENCLOSURE (1)

REPLY TO NRC INSPECTION REPORT
50-317/87-23; 50-318/87-25

We have reviewed the circumstances relative to the recent emergency diesel generator (EDG) trip that led to the alleged violation of 10 CFR 50, Appendix B, Criterion XVI. That criterion requires measures to be established to assure conditions adverse to quality are promptly identified and corrected. We take exception to the cited violation. Our engineering and safety review programs at Calvert Cliffs provide reasonable assurance that problems are promptly identified and corrected.

Regarding No. 12 EDG, obviously conditions adverse to quality were identified as required. Resources were promptly committed to correct the problem, however, our initial diagnosis was incorrect. The subsequent investigation yielded the correct root cause and the condition was corrected.

The following narrative describes the sequence of events represented in the subject inspection. Contrary to the description provided in the report, a detailed investigation was conducted prior to returning No. 12 EDG to service after the initial failure. We believe the discussion provided below demonstrates our position that measures exist at Calvert Cliffs to assure conditions adverse to quality are promptly identified and corrected.

Events Leading to No. 12 EDG Trip

A successful start of No. 12 EDG occurred on September 3, 1987. The engine was started and ran for one hour loaded at 2500 kw. The only work done to any EDG between September 3, and September 8, 1987 was maintenance to 1-SRW-1587-CV (No. 11 EDG Service Water (SRW) supply valve). This required isolating SRW to No. 11 EDG.

Following maintenance to the SRW valve, the SIAS signal was tested in accordance with STP-0-7, which required Nos. 11 and 12 EDG to start. The engines ran and the outside operator noted that 1-SRW-1588-CV (SRW supply to No. 12 EDG) was in automatic and that its Pressure Differential Indication Control (PDIC) indicated a differential pressure. No alarms were noted on the load control panel.

About four minutes later, both engines were started and loaded for the monthly EDG surveillance test (STP-0-8). The Control Room Operator loaded No. 12 EDG to 2500 kw in accordance with the STP. Engine loading is done in steps and takes several minutes. After loading, he left the panel for a minute or so. When he returned, he noticed the EDG local alarm had actuated. The diesel indications and generator volts were decreasing, and the output breaker had opened. Other alarms sounded, indicating the engine had tripped.

The outside operator entered the Diesel Room shortly after No. 12 EDG was started. He made a tour and everything appeared normal. There were no local alarms. He did not notice if PDIC 1588 was indicating a differential pressure. He left the room to monitor No. 11 EDG since it was also running. When he returned to No. 12 EDG, it had tripped. He noted a High Jacket Coolant Temperature alarm. The engine had been running for about 14 minutes.

Investigation After Trip

After the trip, operators noticed that the Control Room indications for 2-SRW-1645 and 1646 were off, and 1-SRW-1645 and 1646 were shut. These are the supply and return SRW valves for No. 12 EDG. The operators verified that 2-SRW-1645 and 1646 were open. They investigated and found a loose fuse holder. The control power was verified restored. The operators also verified that SRW-1588-CV was functioning properly by stroking it and failing it open.

Operators then started, loaded and ran No. 12 EDG for about one hour. The engine functioned properly. After shutdown, the outside operator vented the jacket coolant system. Based on a previous gassing problem in the jacket cooling water system, we investigated this and found no problems with the EDG. The engine was then considered operable.

Normal operation of 1-SRW-1588-CV was reverified. The EDG engine was started and run for approximately 80 minutes. During the run, the System Engineer mapped coolant temperature to verify that the three-way temperature control valve controlled jacket coolant temperature at 170°F. He verified that other operations parameters were normal, and that the stand-by pump de-energized when the engine was started. He also verified that jacket coolant pressure was normal and steady. He compared remote temperature indications with a pyrometer. The indications were within reasonable agreement. The proper operation of the LSA, LSB, LSAX, and LSBX relays was verified. Either LSAX or LSBX must energize to open 1-SRW-1588-CV.

During the 80-minute run, SRW differential pressure across the engine drifted from 7 to 5 psi while the valve was cycling. The drop in differential pressure was not considered a problem since a 5 psi differential still provides sufficient flow to the diesel engine.

The System Engineer and Operations Staff presented the above finding to the Plant Operations Safety Review Committee (POSRC), and it was determined that more information was needed and, therefore, No. 12 EDG was declared inoperable.

Subsequently, mechanics disassembled the three-way temperature control valve for the jacket coolant system and verified that it operated smoothly to control temperature at 170°F. They also verified that the check valve in the jacket coolant system operated smoothly. Technicians calibrated the PDIC for SRW-1588-CV. The technicians found the output low, but not enough to hinder the operation of the control valve. In addition, they checked for normal engine operation and for proper low water level switch, and, low water pressure switch and alarm operation. All operated normally.

A POSRC meeting was convened to review the findings. No cause for the high temperature trip could be identified. All checks and tests were inconclusive. The System Engineer recommended, based on the negative results of the tests and the two successful runs of the engine, that after engine reassembly and test run, the engine be declared operable. POSRC recommended to accept the conclusion with the condition that the System Engineer verify the proper operation of the SRW return check valve by listening to the valve

stroke with a stethoscope. The Manager-Nuclear Operations approved the recommendation. Proper operation of the SRW return check valve was verified. While preparing to test run the engine, a Control Room Operator theorized that the fuse holder for 2-SRW-1645 and 1646 came loose just prior to the EDG starting, which caused both 1-SRW-1645 and 1646 and 2-SRW-1645 to have gone to mid-position, simultaneously, restricting SRW flow to the engine without reducing pressure. Control valves 1-SRW-1645 and 1646 were opened and the Unit Two valves were closed to test the theory. Control valve 1-SRW-1588 was placed in manual and opened. The control power fuses for 2-SRW-1645 and 1646 were pulled. The Unit Two valves failed open and the Unit One valves went shut. While the valves were stroking, engine differential pressure decreased from 14 psi to about 7 psi because a valve failed open. After the valves repositioned, the differential pressure returned to 14 psi in less than ten seconds. The engineering staff concluded that if the fuses made intermittent contact over a period of time, both sets of valves could, in theory, stay intermittent long enough to lead to a high jacket coolant temperature condition. The engine was successfully run at 2500 kw for over one hour and declared operable.

On September 16, 1987, No. 12 EDG was successfully run for one hour in accordance with STP-0-8.

On September 28, 1987, No. 12 EDG was removed from service to repair a fuel oil leak. Upon completion, post maintenance testing was performed. During the testing, the diesel had to be unloaded after nine minutes of operation, and shutdown due to low raw water (service water) pressure. This was because the SRW supply valve (1-SRW-1588-CV) failed to open in automatic. During the troubleshooting effort a second test was run and again the diesel had to be unloaded after six minutes of operation. Troubleshooting revealed that the ASCO solenoid valve (1-SRW-1588-SV) associated with the SRW supply valve was leaking (seat leakage) when in the de-energized position (its position when the EDG is operating), allowing sufficient passage of instrument air to cause closure of the SRW valve. By design, when the solenoid valve de-energizes, it: 1) isolates instrument air from the SRW valve operating diaphragm; 2) vents residual air off the top of the diaphragm back to a controller of a constant air bleed design allowing the valve to open); and 3) allows, through the same path, an output air pressure signal from the controller to regulate the SRW valve position. The controller then regulates SRW valve position, as necessary, to maintain a specified differential pressure across the diesel generator heat exchangers. A new solenoid valve was subsequently installed.

The "failed" solenoid valve was tested in the shop at least six times, and each time, it operated properly. However, there was less load on the solenoid during the shop test. The valve was also disassembled for a detailed inspection. No abnormalities were found.

After replacement of the solenoid valve, the diesel was successfully tested. The apparent root cause of the high temperature trips was intermittent binding of the solenoid valve, not the loose fuse holder as first thought.