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FLORHAM PARK, NEW JERSEY 07932 • N.J. (201) 966-2000 / N.Y. (212) 344-3765 FAX 966-2628

May 27, 1997

FOR
Per
D. Skeen

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTN: Document Control Desk

SUBJECT: Potential Safety-Related Problem with ASCO HV 266000-007J Scram Solenoid Pilot Valves

Dear Sir:

This will provide you with additional information related to my letter of April 29, 1997, concerning the potential safety-related problem with ASCO HV 266000-007J scram solenoid pilot valves (SSPV's).

BACKGROUND:

During performance maintenance testing (PMT) of the SSPV's at Oyster Creek, it was discovered that there was air leakage from some of the SSPV's (V118 valves). The PMT was being performed after the SSPV's had their diaphragms changed to the new diaphragm material which addressed a slow scram insertion time issue. Upon further evaluation of the cause of the air leakage, it was discovered that the air leakage was from hardened core discs in the SSPV pilot heads.

PROBLEM CAUSE:

A General Electric (GE) / Automatic Switch Company (ASCO) joint investigation identified the cause of the problem to be the use of incorrect core disc elastomer material. Specifically, the core disc elastomer material should have been Fluorocarbon (Viton) but was identified as a commercial grade Nitrile (BUNA-N). Material examination of 261 SSPV pilot heads returned from Oyster Creek identified that the incorrect Nitrile material was provided in 44 pilot heads while the correct Fluorocarbon material was provided in 217.

AFFECTED PLANTS:

On the basis of ASCO's investigation, we are now reasonably confident that the total suspect population is 1000 SSPV's. GE/ASCO identified a total of six plants that received the suspect SSPV's with the following distribution:

Oyster Creek	300	Peach Bottom	10
Monticello	260	Brown's Ferry	5
Quad Cities	372	Fitzpatrick	53

POTENTIAL SAFETY IMPACT:

GE/ASCO identified two potential performance impacts that could result from the hardened Nitrile (BUNA-N) core discs:

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1. Disc Fragmentation - No significant impact on Control Rod Drive (CRD) performance as a direct result of the air leakage has been identified. However, a severely degraded disc could fragment and pieces could restrict the air flow path and delay the start of motion of the drive. It could be postulated that a piece of the fragmented disc could completely block the air flow and prevent a scram of that drive. However, this is very unlikely because complete blockage of the air flow path by the brittle Nitrile (BUNA-N) fragments would be very difficult to accomplish. GE's licensing basis analyses already assumes that one control rod does not insert. Failure of more than one CRD, due to all causes, would have to occur before a safety concern would exist. Even in this highly unlikely event there is scram backup from the Backup Scram Valves and the Anticipated Transient Without Scram Alternate Rod Injection Valves which will insert control rods at a slower rate. However, if the affected plants follow the recommendations provided by GE (summarized below), replacement of the suspect pilot valve assemblies (top halves of the SSPV's) should take place well before disc fragmentation can occur.

2. Rod Drifting - While very unlikely, one or more CRD's might exhibit rod drifting if air leakage becomes severe as a result of hardened discs. On the basis of previous drifting rod insertion events at BWR's, potential rod drifting would have little impact on plant safety.

RECOMMENDED CORRECTIVE ACTION FOR AFFECTED PLANTS:

GE and ASCO conducted tests to characterize the aging profile for the commercial grade Nitrile (BUNA-N) discs. Chemical, physical, and accelerated thermal aging tests on the commercial grade Nitrile material provided a performance capability comparison to nuclear grade Nitrile (BUNA-N) that was used in predecessor ASCO supplied HV 90405 SSPV's for many years. The base polymer of both materials is essentially the same and both materials have almost identical levels of Butadiene and Acrylonitrile. On the basis of these tests, it was conservatively determined that the incorrect core disc material would have a predicted acceptable service life of three to four years.

GE provided a Justification for Continued Operation (JCO) to the affected plants which still have SSPV's from the suspect 1000 piece lot installed. It recommended that pretested pilot valve assemblies (top halves of SSPV's) be installed on all suspect valves before they reach the predicted three to four year end-of-life. The JCO also recommended augmented air leakage testing be considered by the plants until the change-out can be completed. As the disc material hardens, air leakage will substantially precede any significant SSPV performance degradation. Leakage can only be identified for the V118 valves and not the V117 valves on each Hydraulic Control Unit (HCU). The JCO advised that any leakage should be considered an indication that the suspect SSPV contains a Nitrile (BUNA-N) disc which may be approaching its end of life limit. It further advised if leakage occurs consideration should be given to replacing all SSPV's in the suspect population.

ASCO INVESTIGATION RESULTS:

An investigation was conducted by ASCO to determine how and when the core assemblies were manufactured using the incorrect commercial grade Nitrile (BUNA-N) discs. Two possible scenarios were identified:

1. Records indicate that several orders for core assemblies containing commercial grade Nitrile (BUNA-N) discs were being manufactured in the core assembly area at ASCO's Aiken, South Carolina facility at the time the suspect lot of nuclear grade core assemblies were being manufactured. These commercial grade core assemblies would have been produced on the same equipment used to assemble the nuclear grade core assemblies, making contamination of the nuclear assemblies a possibility.

2. It was found that during the time of manufacture of the core assemblies for the suspect 1000 SSPV lot, the incorrect commercial grade BUNA-N discs were stocked in a location directly adjacent to the nuclear grade Fluorocarbon (Viton) discs at ASCO's Aiken, South Carolina facility. A stockroom pulling error could have occurred as a result of this adjacent location.

With either scenario, the likelihood of repeat occurrences on other nuclear lots is minimal. In the case of the possible stockroom pulling error, the nuclear stocking area was relocated prior to withdrawals for assembly of the next nuclear grade core assembly lot. Additionally, inspection of 184 SSPV's from the next 1000 piece manufacturing lot of nuclear grade core assemblies showed all to contain the proper Fluorocarbon (Viton) material.

There are a number of inspection steps in the SSPV manufacturing process to ensure correct materials are used in SSPV's. These include:

1. Lot/batch recording and tracking of elastomer components including the subject core disc from receipt of the material, through the manufacture of sub-assemblies, to the final manufacture of the SSPV.
2. First piece sample inspection for correct materials (by color code for the disc) at the manufacturing step where the disc is inserted into the core.
3. Sample final inspection of the core assemblies at completion of the manufacturing run.
4. 100% inspection of the core assemblies (for critical dimensions and assembly color code) prior to final manufacture of the SSPV's.

Unfortunately, none of the controls, all of which were in place at the time of manufacture of the suspect 1000 piece SSPV lot, would have detected the postulated stockroom pulling error.

ASCO CORRECTIVE ACTION:

In order to preclude any recurrence of the above described problem and similar problems with ASCO's SSPV's, the following corrective actions have been taken:

1. All elastomer components are now 100% checked (by color code and durometer) prior to the start of sub-assembly manufacture.
2. Q.C. audits are now performed at completion of sub-assembly processes to ensure that all excess material is removed from the area at the completion of each job.
3. An accounting process has been added as part of all nuclear elastomer stock picks.
4. Only stockroom supervisors and lead people are now allowed to pick components from the nuclear stockroom.

5. Destructive testing sample size has been increased from a maximum of two pieces to five pieces during receiving inspection (from the vendor) prior to release of nuclear elastomer materials to stock.

It has always been ASCO's goal to maintain full compliance with all applicable NRC rules and regulations and to provide the best possible products to the nuclear industry. We believe the above actions are in accordance with this goal and are more than adequate to address this and similar problems. Please feel free to contact me at 201-966-2100 for additional information.

Sincerely,
AUTOMATIC SWITCH COMPANY

Randy P. Smith
President

RPS/ja

CC: General Electric
GPU Nuclear - Oyster Creek
David Skeen - U.S. NRC