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Georgia Power
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Docket Nos. 50-321
50-366

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M88737

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant
Response to Inspection
Report 50-321/95-25 and 50-366/95-25

Gentlemen:

During the week of December 4, 1995, a followup Generic Letter (GL) 89-10 closure inspection was conducted at Plant Hatch. By letter dated January 5, 1996, the NRC issued Inspection Report (IR) 95-25, requesting Georgia Power Company (GPC) to provide additional information on two open items.

An initial closure review for GL 89-10 was conducted during the week of February 13, 1995. The review resulted in five open items which are discussed in IR Nos. 50-321/95-02 and 50-366/95-02. Ensuing discussions with the NRC staff resulted in the followup closure review performed the week of December 4.

The requested additional information on the two remaining open items is provided below. A transcription of portions of the NRC item from each of the two inspection reports precedes the GPC response. Additional information is also provided in the enclosure.

I. SCOPE OF VALVES

From IR 95-02, Item (5):

In a letter dated February 3, 1994, the licensee informed the NRC of the deletion of specified MOVs and testing from their GL 89-10 program. The acceptability of the deletions is currently being evaluated by the NRC. This was identified as Inspector Followup Item 50-321, 366/95-02-05, Scope of Valves and Testing. [Section 2.5]

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From IR 95-25, Item 2.5:

50-321, 366/95-02-05, Scope of Valves and Testing.

This IFI identified [sic] concern as to the scope of MOVs and design functions that should be included in the Hatch GL 89-10 program. During Inspection 95-02 the NRC Office of Nuclear Reactor Regulation was in the process of reviewing the licensee's deletion of valves from their original GL 89-10 program. Subsequently, licensee deletions involving over 50 MOVs were rejected in a formal NRC evaluation dated October 16, 1995.

During the current inspection the inspector found that the licensee had not returned the deleted MOVs to their GL 89-10 program in accordance with the results of the NRC evaluation referred to above. Licensee personnel stated that they were awaiting the results of an NRC evaluation of deletions from the Browns Ferry GL 89-10 program before taking further action. The NRC inspector verified that the involved valves were set and sized adequately to meet the intent of GL 89-10, relieving any immediate concern. He stated that the licensee would be requested to provide plans and a schedule for resolution of the scope issue and to verify that the involved valves would be maintained consistent with GL 89-10 until resolution of the issue.

GPC Response

Following GPC's February 3, 1994 letter, the NRC requested additional information regarding the deletion of specified MOVs. The requested information was transmitted to the NRC by GPC letter dated March 14, 1995. By letter dated October 16, 1995, the NRC issued a safety evaluation report (SER) addressing the deletion of certain MOVs from the Plant Hatch GL 89-10 Program. As stated in the SER, the NRC staff disagreed with the reclassification of several MOVs and requested the need for additional justification.

Item 95-02-05 remains unresolved. However, the MOVs in question will be maintained consistent with GL 89-10 requirements until the issue is resolved. The scope issue will be resolved via a recently formed BWR Owners Group Subcommittee.

II. DESIGN ASSUMPTIONS

From IR 95-02, Item (1):

The adequacy of MOV setting and sizing determinations for valves not dynamically tested was indeterminate. The licensee is being requested to re-evaluate and submit justifications for the valve factor (VF), stem coefficient of friction (COF), and load sensitive behavior assumptions used in sizing and setting determinations for the following valves: 1E41F001, 1E41F006, 1E11F008, 1E11F009, 1B31F031A/B, 1B21F019, 2B31F031A/B, 1B21F016, 2B21F016, 2B21F019, 2E51F007, 2E51F008, 2E51F013, 2G31F001, 2G31F004, 2E21F005A/B, 2E41F001, 2E41F003, and 2E41F006. This was identified as Inspector Followup Item 50-321, 366/95-02-01, Determination of Settings for Valves not Dynamically Tested. [Section 2.2.1]

From IR 95-25, Item 2.1:

Summary

The inspector found that most of the original concern expressed in this IFI was resolved. However, three issues remained:

- The VF used in calculating the settings for Valves 2B31F031A/B, 1B21F016, and 1B21F019 had not been sufficiently justified.

- The COF established was not adequately justified.

- The licensee was in the process of addressing new industry information regarding performance of valves that could experience blowdown conditions.

The licensee was informed that the original IFI would be closed and that a written response would be requested for the above issues. A new IFI was identified for resolution of the issues that remained. The new IFI was designated 50-321, 366/95-25-01, Valve Factor and Coefficient of Friction Issues. In his review the inspector noted a particular weakness, the licensee's inadequate statistical analysis of COF data discussed above.

GPC Response

A. Valve Factor

The valve factor for 1B21-F016 and 1B21-F019 has been increased to 0.6. Also, based on industry data, the valve factor for 2B31-F031A/B has been changed to 0.694. GPC will continue to monitor industry data for information that may affect the design assumptions for these valves. Information obtained will be used to make appropriate adjustments to the design assumptions.

Detailed information on valve factors for the valves referenced above is provided in the enclosure to this letter. The information provided in the enclosure was discussed with the inspector during the December review.

B. Coefficient of Friction

1. All non-torque tested valves were evaluated using a COF of 0.18 and no operability concerns were identified. The COF design assumptions for the subject valves will be changed to 0.18 by the end of the Unit 1 Spring 1996 refueling outage.

2. The review of static and dynamic test data will be an ongoing effort used to confirm the validity of the design assumptions.

The above actions addressing COF will be applied to the MOVs listed in the October 16, 1995 SER and discussed in item I, Scope of Valves, above.

3. Blowdown Valves

During the December review, the inspector addressed an industry concern regarding unpredictable valve factors resulting from the closure of gate valves under blowdown conditions. GPC is resolving the issue of sharp edges and improper internal clearances in the following valves:

- G31-F001 and F004 - Reactor Water Cleanup System
- E41-F002 and F003 - High Pressure Coolant Injection System
- E51-F007 and F008 - Reactor Core Isolation Cooling System
- E11-F008 and F009 - Residual Heat Removal System
- B21-F016 and F019 - Main Steam System[a].

Appropriate maintenance procedures will be revised based on the recommendations contained in EPRI Report TR-103244. The revision process will be completed by March 21, 1996. Efforts to eliminate the sharp edges and provide proper clearances will be performed simultaneously with work activities which require valve disassembly.

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[a] Although these valves are not susceptible to blowdown conditions, they are included based on the inspector's input.

With the submittal of this letter and the commitments stated herein, it is GPC's understanding that the Plant Hatch GL 89-10 program is closed.

Should you have any questions in this regard, please contact this office.

Sincerely,

J. T. Beckham, Jr.

OCV/eb

Enclosure: Generic Letter 89-10 Valve Factor Justification

cc: *Georgia Power Company*
Mr. H. L. Sumner, Nuclear Plant General Manager
NORMS

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. K. Jabbour, Licensing Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. S. D. Ebneter, Regional Administrator
Mr. B. L. Holbrook, Senior Resident Inspector - Hatch

Enclosure
Edwin I. Hatch Nuclear Plant
Generic Letter 89-10 Valve Factor Justification

MOVs 2B31-F031A and F031B

System: Reactor Recirculation

Description: 28-in., 900-lb Flex Wedge Gate Pump Discharge Valves

Active Safety Function: Close in the event of a design basis loss of coolant accident

Vendor: Lunkenheimer

Drawing No.: S42605

Close Accident Differential Pressure: 200 psid (hot water)

Valve Internals:

- Disc Material: SA351 CF8M
- Disc Hardfacing: Stellite No. 21
- Disc Guide Hardfacing: Stellite No. 21
- Seat Ring Material: SA351 CF3A
- Seat Ring Hardfacing: Stellite No. 6

Valve Factor:

Plant and Industry Data:

Plant Hatch MOVs 1E11-F015A & B are Crane 24-in., 900-lb flex wedge gate valves with internal parts similar to MOVs 2B31-F031A&B. Using criteria developed for evaluating the EPRI valve test results (calculation SMNH 94-030), the 28" valves are considered to exhibit similar performance characteristics in the 24" valves, which were dynamically tested.

MOVs 1E11-F015A&B were also dynamically tested with cold water at a differential pressure (dP) of 231 psid. The highest valve factor observed was 0.39. Appendix A of EPRI Topical Report TR-103237, issued in November 1994, provides evidence that apparent disc coefficients are lower in hot water tests than in cold water tests.

MOVs 2B31-F031A&B have Stellite No. 21 on the disc guides, whereas MOVs 1E11-F015A&B do not have hardfaced disc guides. EPRI TR 103237 shows that, for hot water conditions, the friction coefficient for Stellite-carbon steel edge on flat contact (valve disc on seat ring) is less than the friction coefficient for carbon steel-carbon steel

edge on flat contact (valve disc on seat ring). Thus the Lunkenheimer valves should require less thrust than the Crane valves.

PRI MOV PPM Data

At another utility, two 28-in. Lunkenheimer valves are used in the recirculation pump discharge lines. Thus, their application is identical to Plant Hatch's application.

The EPRI MOV computer program was run on the Lunkenheimer valves at a dP of 175 psid. From this analysis, a closing valve factor of 0.694 was calculated. MOVs 2B31-F031A&B were evaluated using:

1. Valve factor of 0.694.
2. Design basis dP of 200 psid.
3. Measured COF.
4. Measured packing load.
5. Voltage available at design basis conditions.

Both MOVs were capable of closing against a valve factor of 0.694. Implementation of Design Change Request 94-034 increased the capability of these valves by removing the torque switch from the close circuit to ensure full motor capability for closing.

Conclusion:

The design assumption for the valve factor shown in the MOV Torque Switch Setting Guide will be revised to 0.694. This will be completed by the end of the upcoming Unit 1 refueling outage scheduled for March, 1996. The value is justified by the validation of the EPRI program.

MOV 1B21-F019

System: Main Steam

Description: 3-in., 600-lb Flex Wedge Gate Steam Line Drain Valve

Active Safety Function: Close on a primary containment isolation signal. (Plant Startup Procedure 34GO-OPS-001-1S confirms this valve closed prior to exceeding 25% power.)

Vendor/Drawing No.: KSB/S53033

Close Accident Differential Pressure: 1065 psid (steam)

Valve Internals:

- Disc Material: SA105
- Disc Hardfacing: Stellite No. 6
- Body Guide Material: SA105
- Seat Ring Material: SA105
- Seat Ring Hardfacing: Stellite No. 6

Velan-manufactured EPRI valves nos. 13 and 24 are appropriate for comparison to the 1B21-F019 KSB valve based on the following discussion. EPRI determined that the guide rails for valves nos. 13 and 14 were welded much closer to the bottom end, and high bending stresses did not occur. This type construction should produce results similar to a valve with integral guides or guides welded with a continuous weld; e.g., the KSB valve. Additionally, the EPRI predictions for normal flow steam tests were carried out for EPRI valve no. 24 at a single dP. If the EPRI MOV computer analysis could be run for the KSB valve, the results should be similar to the results for valve no. 24. However, the EPRI MOV computer analysis is not configured to accurately model the performance of the KSB valve under steam isolation conditions.

Valve Factor

Industry Testing

KSB was contacted but did not have any test data for the valves in question. One other utility uses four 4-in. KSB double disc gate valves as boron injection tank inlet isolation valves. A review of the valve drawings indicates the KSB double disc gate valves are similar in configuration to the KSB flexible wedge gate valve (1B21-F019) used at Plant

Hatch and have the same stem-to-disc connection. KSB information shows similarities in the materials of construction.

The four double disc gate KSB valves were dynamically tested under conditions of approximately 2250 psid and water at 100°F. Based on this testing, the valves were set up with a valve factor of 0.5. However, MOV 1B21-F019 isolates steam flow at 1065 psid. EPRI's Topical Report (Table E-14, Valve No. 24) provides evidence that the high pressure, cold water pumped flow conditions of the KSB double disc gate valves result in higher valve factors than steam isolation or steam blowdown conditions. Therefore, the valve factor of 0.5 should be bounding for the steam isolation conditions of MOV 1B21-F019.

EPRI Comparison

EPRI valve no. 13 is included in this evaluation by virtue of its size, test conditions, and Stellite on Stellite (disc/seat ring) arrangement, which is similar to valve 1B21-F019. EPRI valve no. 24 is included in this evaluation by virtue of its test conditions and Stellite on Stellite (disc/seat ring) arrangement. The closest matches were EPRI valve no. 13 tested at hot water blowdown conditions and EPRI valve no. 24 tested at hot water and steam blowdown conditions. Page E-26 of EPRI's MOV PPP Topical Report states: "Hot water blowdown appears slightly more severe than steam blowdown conditions." This conclusion is substantiated by a review of the apparent disc coefficients for EPRI valve no. 24. (See page E-49 of the subject report.)

Southern Company Services calculation SMNH 95-023 converts the EPRI apparent disc coefficients into valve factors using the Plant Hatch MOV program methodology. A review of these valve factors substantiates EPRI's conclusion relative to hot water blowdown conditions. For valve no. 24, the valve factors were higher for the tests conducted at approximately 50% of the maximum dP observed during the hot water and steam testing. Valve no. 13 was tested at hot water, high pressure blowdown conditions and performed much more predictably than at cold water conditions.

During an accident, MOV 1B21-F019 could be called upon to close under steam isolation conditions of 1065 psid. These conditions are more benign than the steam blowdown conditions of valve no. 24, which exhibited a close valve factor of 0.3993. Additionally, the hot water blowdown conditions of valve no. 13 (valve factor of 0.4761) would be expected to bound the steam isolation conditions of 1B21-F019.

If the EPRI MOV computer analysis could be run solely for the disc sliding on the body guide and transitioning to the seat ring, the results should be similar to those evidenced by EPRI valve no. 24 (only EPRI valve tested for normal steam isolation). However, when taking into consideration the connection between the stem and the disc, the EPRI analysis cannot handle this unique configuration.

Plant Hatch evaluated static traces for this MOV and found no abnormalities in the traces. Testing on the four double disc gate valves having the same stem-to-disc connection as 1B21-F019 did not yield anomalous test results. In fact, the conclusion to use a valve factor of 0.5 for the four boron tank valves suggests the performance of these valves is relatively conventional despite their unique design characteristics.

Conclusion

The valve factor of 0.5 is justified for MOV 1B21-F019. The valve's current setup provides the capability to close against a maximum valve factor of 0.687.

MOV 1B21-F016

System: Main Steam

Description: 3-in., 900-lb Flex Wedge Gate Steam Line Drain Valve

Active Safety Function: Close on a primary containment isolation signal. (Plant Startup Procedure 34GO-OPS-001-1S confirms this valve closed prior to exceeding 25% power.)

Vendor/Drawing No.: Pacific/S30401

Close Accident Differential Pressure: 1065 psid (steam)

Valve Internals:

- Disc Material: SA105
- Disc Hardfacing: Stellite No. 6
- Body Guide Material: SA105
- Seat Ring Material: SA105
- Seat Ring Hardfacing: Stellite No. 6

Velan-manufactured EPRI valves nos. 13 and 24 are appropriate for comparison to the 1B21-F016 Pacific valve based on the following discussion. EPRI determined that the guide rails for valves nos. 13 and 14 were welded much closer to the bottom end, and high bending stresses did not occur. This type construction should produce results similar to a valve with integral guides or guides welded with a continuous weld; e.g., the Pacific valve. Additionally, the EPRI predictions for normal flow steam tests were carried out for EPRI valve no. 24 at a single dP. If the EPRI MOV computer analysis could be run for the Pacific valve, the results would be similar to the EPRI valves. EPRI valves nos. 13 and 24 have torque arms which negate the adverse effect of the stem T-head being perpendicular to the flow. Therefore, these EPRI valves would be expected to perform similar to a valve with a stem T-head parallel to flow.

Valve Factor

A Pacific gate valve that had been dynamically tested with steam was not found. EPRI tested a 4-in. Pacific gate valve with ambient water at differential pressures of 90 psid and 270 psid. The highest apparent disc coefficient observed was 0.347. Under incompressible flow conditions, EPRI concluded that Pacific solid and flexible wedge gate valves exhibited relatively conventional performance. However, it may be inappropriate to directly compare the results from testing this valve to the steam isolation conditions for 1B21-F016.

EPRI valve no. 13 is included in this evaluation by virtue of its size, test conditions, and Stellite on Stellite (disc/seat ring) arrangement which is similar to MOV 1B21-F016. Although EPRI valve no. 13 is a stainless-steel valve, EPRI concluded that carbon steel friction coefficients apply to valves with stainless-steel internals. EPRI valve no. 24 is included in this evaluation by virtue of its test conditions, materials of construction, and Stellite on Stellite (disc/seat ring) arrangement. Although valve no. 24 is a 6-in. valve, it is close enough in size to 1B21-F016 for evaluating test results.

It should be noted that the Velan valves have welded guides, whereas the Pacific valve has cast guides. The Velan valves (EPRI valves nos. 13 and 24) have welds close to the bottom end of the guide, and high bending stresses did not occur (EPRI Topical Report, page 5-19). Therefore, the performance of the EPRI valves should be similar to the Hatch Pacific valve.

The closest matches were EPRI valve no. 13 tested at hot water blowdown conditions and EPRI valve no. 24 tested at hot water and steam blowdown conditions. Page E-26 of EPRI's MOV PPP Topical Report states: "Hot water blowdown appears slightly more severe than steam blowdown conditions." This conclusion is substantiated by a review of the apparent disc coefficients for EPRI valve no. 24. (See page E-49 of the subject report.)

Southern Company Services calculation SMNH 95-023 converts the EPRI apparent disc coefficients into valve factors using the Plant Hatch MOV program methodology. A review of these valve factors substantiates EPRI's conclusion relative to hot water blowdown conditions. For valve no. 24, the valve factors were higher for the tests conducted at approximately 50% of the maximum dP observed during the hot water and steam testing. Valve no. 13 was tested at hot water, high pressure blowdown conditions and performed much more predictably than at cold water conditions.

During an accident, MOV 1B21-F016 could be called upon to close with steam isolation conditions of 1065 psid. The severity of steam isolation conditions is much less than the steam blowdown conditions of valve no. 24, which exhibited a close valve factor of 0.3993.

The hot water blowdown conditions of EPRI valve no. 13 (valve factor of 0.4761) would be expected to bound the steam isolation conditions of valve 1B21-F016.

Conclusion

A valve factor of 0.5 is justified for MOV 1B21-F016. The current setup of the MOV enables the valve to close against a maximum valve factor of 0.714.

SUMMARY

EPRI tested valves with cast, welded, and insertable guides and the following issues were identified:

1. Only stitch welded guides found in the Velan valves could be bent, resulting in significant problems for steam application. At Plant Hatch, the guide rails for the recirculation system valves are manufactured by Lunkenheimer. The guide rails for the main steam line drain valves are manufactured by Pacific and KSB. The guide rails for the subject valves are integral to the valve body, or welded with a continuous weld, and are not susceptible to the bending observed in the Velan valves.

2. Valves with cross T-head stem designs in which the slot is perpendicular to the flow have the potential for higher-than-expected thrust requirements. This abnormal behavior is recognizable in a static thrust signature. Accordingly, using EPRI guidance, GPC reviewed the static thrust traces for abnormalities that may indicate a valve problem. No problems were identified. The stem T-head joints for the Lunkenheimer and Pacific valves are parallel to the flow and, thus, are not subject to the stem eccentricity and misalignment of the disc guiding components observed in the Borg-Warner gate valves (the valves in which the problem was originally discovered).

3. The stem/disc joint found in the KSB valves is not similar to any configuration tested by EPRI. Since the static traces did not reveal any abnormal behavior, the KSB-manufactured valves should exhibit conventional performance characteristics.