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September 16, 2002

U.S. Nuclear Regulatory Commission
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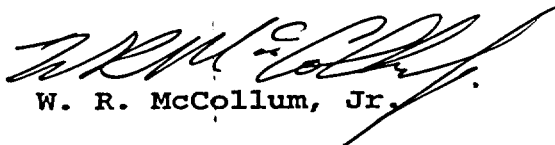
Subject: Oconee Nuclear Station
Docket Nos. 50-269
Licensee Event Report 269/2002-05, Revision 0
Problem Investigation Process No.: O-02-3626

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 269/2002-05, Revision 0, concerning a potential inoperability of a Main Steam Atmospheric Vent Block Valve due to possible Pressure Locking during postulated event scenarios.

This report is being submitted in accordance with 10CFR 50.73(a)(2)(i)(B) "Any operation or condition prohibited by the plant's Technical Specifications" and 50.73(a)(2)(v) "Any event or condition that could have prevented the fulfillment of a safety function... needed to: d. Mitigate the consequences of an accident." This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



W. R. McCollum, Jr.

Attachment

IE22

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Date: September 16, 2002
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cc: Mr. Luis A. Reyes
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U.S. Nuclear Regulatory Commission
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Mr. L. N. Olshan
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Mr. M. C. Shannon
NRC Senior Resident Inspector
Oconee Nuclear Station

INPO (via E-mail)

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Oconee Nuclear Station, Unit 1

2. DOCKET NUMBER

050- 0269

3. PAGE

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4. TITLE

Potential Failure of Manual Atmospheric Dump Valve due to Pressure Locking

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	28	97	269	- 05	- 00	9	16	2002	None	
9. OPERATING MODE		1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check all that apply)							
10. POWER LEVEL %		100	20.2201(b)			20.2203(a)(3)(ii)			50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
			20.2201(d)			20.2203(a)(4)			50.73(a)(2)(iii)	50.73(a)(2)(x)
			20.2203(a)(1)			50.36(c)(1)(i)(A)			50.73(a)(2)(v)(A)	73.71(a)(4)
			20.2203(a)(2)(i)			50.36(c)(1)(ii)(A)			50.73(a)(2)(v)(A)	73.71(a)(5)
			20.2203(a)(2)(ii)			50.36(c)(2)			50.73(a)(2)(v)(B)	
			20.2203(a)(2)(iii)			50.46(a)(3)(ii)			50.73(a)(2)(v)(C)	OTHER Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.73(a)(2)(i)(A)		X	50.73(a)(2)(v)(D)	
			20.2203(a)(2)(v)		X	50.73(a)(2)(i)(B)			50.73(a)(2)(vii)	
			20.2203(a)(2)(vi)			50.73(a)(2)(i)(C)			50.73(a)(2)(viii)(A)	
			20.2203(a)(3)(i)			50.73(a)(2)(ii)(A)			50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME L.E. Nicholson, Regulatory Compliance Manager	TELEPHONE NUMBER (Include Area Code) (864) 885-3292
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On 11-28-97, during a Unit 1 refueling outage, 1MS-156, "1B MS Line Atmospheric Vent Block Valve" was replaced with a flexible wedge gate valve design. On 7-8-02, as part of a project to review manual valves for pressure locking (PL) vulnerability, Engineering identified that 1MS-156, was potentially susceptible to PL. Valves in this application on other trains/units are solid wedge design. On 7-10-02 a vent line was installed on the valve bonnet, ending the potential for PL.

At 1600 hours on 7-18-02, with Unit 1 operating in Mode 1 at 100 per cent, 1MS-156 was determined to have been inoperable from 11-28-97 until 7-10-02 due to the potential for PL to prevent opening during postulated events. At 1843 hours on 7-18-02, an 8-hour Non-Emergency Notification was made to the NRC under 10 CFR 50.72(b)(3)(v).

The root cause of this event is deficient design, due to an unanticipated system interaction, which resulted from a lack of awareness of pressure locking as a concern for manual valves. This event is considered to have no significance with respect to the health and safety of the public.

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NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

EVALUATION:

BACKGROUND

This event is reportable per 10CFR 50.73(a)(2)(i)(B) "Any operation or condition prohibited by the plant's Technical Specifications" and 50.73(a)(2)(v) "Any event or condition that could have prevented the fulfillment of a safety function... needed to: d. Mitigate the consequences of an accident."

The Main Steam (MS) System [EIIS:SB] delivers steam to various components, including the main turbine, main feedwater pumps and a turbine driven Emergency Feedwater (EFDW) [BA] pump. During shutdowns, the MS System is used to cooldown the Reactor Coolant System (RCS) [EIIS:AC] until the Low Pressure Injection (LPI) [EIIS:BP] system is placed in service. The MS relief valves will relieve excess steam until the output is reduced such that the Turbine Bypass Valves (TBVs) can handle all the steam generated. RCS cooldown and depressurization is then continued using only the TBVs until LPI cooling is established. However, the TBV path may not be available during some accident/event scenarios. Therefore, the atmospheric dump valves (ADVs) are credited in those analyses to cool down and depressurize the RCS. Local manual actions are required to open the ADVs.

Each ADV path actually includes two parallel sub-paths. Upon initiation, the MS Line Atmospheric Vent Valves (e.g. 1MS-155) and Atmospheric Control Valves (e.g. 1MS-164) are opened in series to establish a flow path. However, when system pressures are reduced, the MS Line Atmospheric Vent Block Valves (e.g. 1MS-156) can be opened in parallel to the Atmospheric Control Valves to provide additional flow to increase the rate of RCS cooldown and depressurization.

Technical Specification 3.7.4 requires the ADV path for each steam generator [EIIS:SG]] to be operable in Modes 1, 2, and 3 and in Mode 4 whenever the steam generator is relied upon for heat removal. The required action for one inoperable path (condition A) is to be in Mode 3 within 12 hours and Mode 4 within 24 hours.

On 1/29/99, during a periodic stroke test of 1FDW-313, a manual valve used in an alternate emergency feedwater alignment, Operators

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noted that it took the effort of several operators to open 1FDW-313. This difficulty was later attributed to Pressure Locking (PL). As a result of that event, Engineering has a project in progress to evaluate active manual valves with respect to PL and thermal binding to assure the ability to meet design basis required functions. The problem with 1MS-156 discussed below was identified by this project.

Prior to discovery of this condition Unit 1 was operating in Mode 1 at 100% power with no safety systems or components out of service that would have contributed to this condition.

EVENT DESCRIPTION

On 7-8-02, as part of the PL/thermal binding review project, Engineering identified that valve 1MS-156, "1B MS Line Atmospheric Vent Block Valve" was potentially susceptible to PL. A comprehensive engineering evolution was initiated, including an operability evaluation and, in parallel, preparation of a modification to install a bonnet vent line. On 7-10-02 a vent line was installed on the valve bonnet, ending the potential for PL.

This condition affected Unit 1 and specifically 1MS-156 only, because valve 1MS-156 has a flexible wedge design and the other valves in this application (1,2,3 MS-154 and 2,3 MS-156) are solid wedge design. The flexible wedge design made valve 1MS-156 more susceptible to PL.

Based on the function and operating conditions of the valve, the pressure locking analysis involved complex thermal hydraulic calculations. At approximately 1600 hours on July 18, 2002, it was determined that valve 1MS-156 must be considered to have been inoperable in the past due to the potential for PL to prevent proper opening of the valve during postulated events. The period of vulnerability extended from 11-28-97, when the current valve model was installed during a refueling outage, until installation of the bonnet vent on 7-10-02.

Following this determination, at 1843 hours, an 8-hour Non-Emergency Notification was made to the NRC under 10 CFR 50.72(b)(3)(v).

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CAUSAL FACTORS

The root cause of this event is deficient design, due to an unanticipated system interaction, which resulted from a lack of awareness of PL as a concern for manual valves.

PL and thermal binding have been issues since at least the early 1980s. SOER 84-7, "Pressure Locking and Thermal Binding of Gate Valves," addresses several events which occurred in the 1983-84 era. Generic Letter (GL) 89-10 and subsequent supplements to it also addressed PL. As GL 89-10 testing experience grew and specific problems were identified, several additional communications such as Information Notices 92-26, 95-14, 95-18, 95-30 and Generic Letter 95-07 were issued. These documents specifically focused on power operated valves and did not significantly address manual valves.

At least two INPO Nuclear Network entries did address failures of manual valves attributed to PL. However, the Duke Power Operating Experience Database (OEDB) evaluated these two events as procedural guidance issues (operation of the valve/system in a sequence that resulted in a PL condition) rather than as a valve design issue (design of the valve may result in PL if challenged). Therefore the events were considered as not applicable to Oconee and no changes were implemented at Oconee due to these two events.

NSD 301 "Nuclear Station Modifications," Appendix A "Technical Issues Checklist (TIC)" was revised on 6/13/96 to state the following:

"Does the change affect a gate valve in any manner? If the answer is YES ensure GL 95-07 pressure locking/thermal binding issues are reviewed and incorporated and contact the valves and Hx equipment section."

However, since GL 95-07 addresses power operated valves, this TIC list entry can be, and has been, interpreted as not applicable to manual valves.

Furthermore, per NSD 301.5.1.2, "The TIC list shall be completed for... minor modifications... that are NOT form, fit, function, one-to-one replacements." (Emphasis in original) Since most valve replacements are considered like-for-like replacements, the TIC list is typically not completed.

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In addition, although the flexible wedge design was known to be unsuitable for applications that might be challenged under PL conditions, the design/supply data available at the time did not indicate to the valve engineer that the new valve included a flexible wedge.

Therefore, when the modification was designed in October 1997 for installation of the current valve as 1MS-156 in November 1997, the replacement was considered a like-for-like replacement of a manual valve. PL considerations were not part of the design criteria.

When Oconee experienced a PL event on a manual valve in 1999 (the 1FDW-313 event discussed above), which was similar to the prior industry events, the subsequent corrective actions were broad based, and resulted in the discovery of the vulnerability of 1MS-156 to PL. It is noted that the problem being reported in this LER is a potential failure due to PL, whereas the two industry events referenced above were actual failures.

CORRECTIVE ACTIONS

Immediate:

1. 1MS-156 was modified to include a bonnet vent to minimize the potential for a future pressure locking event.

Subsequent:

None

Planned:

1. The ongoing project to evaluate manual valves for vulnerability to pressure locking/thermal binding will continue.
2. Engineering will determine the appropriate Design documentation and administrative controls needed in order to establish and maintain configuration control with respect to pressure locking/thermal binding issues for manual valves.

These corrective actions are not considered NRC Commitment items. There are no NRC Commitment items contained in this LER.

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SAFETY ANALYSIS

This event did not include an actual Safety System Functional Failure (SSFF). However, it is being reported, in part, because of the potential for a SSFF. In this case a failure of the turbine bypass valve system and an actual PL event affecting 1MS-156 must occur in conjunction with an initiating event in order for a SSFF to occur.

Further, based on indications of seat leakage observed during the installation of the bonnet vent, it is reasonable to conclude that actual pressure locking of the installed valve could not have occurred.

For some accident scenarios, a rapid cooldown to conditions allowing LPI alignment for decay heat removal is desirable in order to limit offsite radiological releases. Normally, the TBVs provide this function. However, the TBVs are not considered safety related so several Updated Final Safety Analysis Report (UFSAR) accident analyses credit use of the ADVs for this purpose. The accidents crediting the ADVs to cool down and/or depressurize the RCS during accident conditions are:

- Steam generator tube rupture (SGTR)
- Rod ejection
- Small/large steam line break
- Locked rotor

Also, use of ADV's may be desirable for small break Loss of Coolant Accidents (LOCAs) with very small break sizes for which break cooling is not sufficient to cool down the plant.

The unavailability of 1MS-156 due to potential PL had only a small impact on the core damage and large early release probabilities. For most accident sequences, hot shutdown conditions are an acceptable end state for the Probabilistic Risk Assessment (PRA) analysis because core damage is prevented. However, there are two types of sequences in the PRA that require a complete depressurization of associated steam generator ("1B") and where manual operation of 1MS-156 would be highly desirable.

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The first is a SGTR in which the normal depressurization method (via the TBVs) is not available. In this case, a failure of 1MS-156 could delay a full depressurization if steam generator 1B is the intact steam generator. However, the Oconee emergency operating procedures provide additional guidance to "steam" the ruptured steam generator to bring the RCS temperature and pressure down to LPI decay heat removal conditions. Thus, a failure of 1MS-156 during a SGTR might increase the time required until the affected steam generator could be isolated. The failure of 1MS-156 would not cause a significant increase in the likelihood that the sequence would proceed to core damage.

The second type of accident sequence is one in which the Station Auxiliary Service Water (ASW) System [EIIS:BA] pump is used to provide secondary-side heat removal. These sequences are comprised of High Energy Line Breaks (HELBs) or Tornado events that cause a loss of all essential 4kV power. This alignment requires a rapid depressurization of both steam generators in order to reduce pressure to below the shut-off head of the Station ASW pump, which is a low-head pump. Since the vent path through the Atmospheric Vent and Control Valves (e.g. 1MS-155 and 1MS-164) has sufficient capacity for these scenarios, operation of the Atmospheric Vent Block Valve (e.g. 1MS-156), although desirable, is not required. Therefore, the problem with 1MS-156 would have very little, if any, impact in these scenarios.

Therefore, there was no actual impact on the health and safety of the public due to this event.

ADDITIONAL INFORMATION

This event addresses discovery of a postulated past inoperability of a component for longer than allowed by the TS required action time due to an unanticipated system interaction. A review of previous events identified two similar events. LERs 269/2002-01 and 269/2002-02 addressed significantly different technical issues but also involved postulated inoperabilities longer than allowed by TS required action times and both due to unanticipated system interactions. Due to the significantly different technical issues involved and the historical nature of the events, no corrective action from the events reported earlier would have prevented this event.

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There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.

This event is not considered reportable under the Equipment Performance and Information Exchange (EPIX) program.