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ACCESSION NBR:9607240135 DOC.DATE: 96/07/18 NOTARIZED: NO DOCKET #
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50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
AUTH.NAME AUTHOR AFFILIATION
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards response to request for addl info re GL 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves."

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Duke Power Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

J. W. HAMPTON
Vice President
(864)885-3499 Office
(864)885-3564 Fax

DUKE POWER

July 18, 1996

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Duke Power Company
Oconee Nuclear Site
Docket Nos. 50-269, -270, -287
Generic Letter 95-07
Response to Request for Additional Information

Per letter dated June 13, 1996, the NRC requested additional information regarding Duke's response to Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves". Please find attached Duke's response to this request. Per discussion with your staff on July 11, 1996, an extension of five days for response to this information request was granted.

If there are any questions or further information is needed, you may contact D. A. Nix at (864) 885-3634.

Very truly yours,

J. W. Hampton,
Site Vice President

Attachments

A056 1/1

xc: Mr. D. E. LaBarge, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. S. D. Ebneter
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission

Mr. P. E. Harmon
Senior NRC Resident Inspector
Oconee Nuclear Station

Mr. Max Batavia
Bureau of Radiological Health
SC Dept. of Health and Envionmental Control
2600 Bull St.
Columbia, SC 29201

Attachment 1

Response to Request for Additional Information

Question 1:

Regarding valves 1, 2, 3 LP-17, -18, Low Pressure Injection RB Isolation valves, the licensee's submittal states that administrative controls exist to limit maximum pressure in this line to 225 psig. The NRC staff believes that reliance on check valves to limit the pressure can be uncertain. Please provide detailed information regarding the administrative controls existing to limit pressure in this line.

In addition, the licensee's submittal states that calculations have been performed that demonstrate the capability of these valves to open under potential pressure locked conditions. Please provide these calculations for our review. Also, please include any associated actuator capability and thrust requirement calculations.

Response:

Oconee Nuclear Station has been performing inter-system leak rate testing of 1, 2, 3LP-17, -18 since 1974. Surveillance of the downstream piping of gate valves 1, 2, 3LP-17, -18 has shown that check valves 1,2,3 LP-48, 1,2,3 CF-13, -14, 1,2,3 LP-47, and 1,2,3 CF-11, -12, provide tight sealing integrity. These lines are presently checked every quarter while at power to verify that there is no significant pressure downstream of gate valves LP-17, -18. This surveillance frequency has shown that the check valves are leak tight. The procedures for performing these surveillances are provided in Attachments 2 and 3.

Modifications to install permanent pressure gauges on all three Oconee units are planned prior to the 3EOC16 refueling outage. Installation of permanent pressure gauges will eliminate the need to install and remove temporary pressure gauges on these lines every time the leakage surveillance is performed. As a result, installation of permanent pressure gauges will decrease operator burden and minimize the ALARA concerns associated with performance of this surveillance. The surveillance frequency will be increased subsequent to pressure gauge installation. Therefore, the installation of the permanent pressure gauges result in further assurance of

the integrity of the check valves for the piping downstream of valves 1, 2, 3LP-17 and -18 and will demonstrate acceptability for short-term operation of this portion of the Low Pressure Injection (LPI) System.

To provide a long term solution to this issue, beginning with the 3EOC16 refueling outage and continuing with subsequent refueling outages, a modification package will be implemented to route 1/2" tubing from the bonnet leak-off connection for each gate valve back to a valve installed on the LPI piping downstream of each gate valve.

Please see the calculations for the available thrust margin of valves 1, 2, and 3LP-17, 18 in Attachment 4.

Question 2:

Regarding valves 1, 2, 3 RC-4, PORV Block Valve, the licensee's submittal states that calculations have been performed to quantify the effects of pressure locking. Please provide these calcuations for our review. Also, please include any associated actuator capability and thrust requirement calculations.

In addition, the licensee's submittal states that the actuator thrust requirement for valve 3RC-4 is 14,569 lbs. and the actuator available thrust is 14,052 lbs. Please provide your basis for the capability of this valve to perform its safety function.

Response:

The 180 day response to Generic Letter 95-07 contained typographical errors regarding the required and available thrust values for valves 1, 2, and 3RC-4. The correct required thrust should have been 12,331 lbs and the correct available thrust should have been 14,569 lbs. The margin of 18% was correct as provided.

Since submittal of the 180 day response, diagnostic test engineers have evaluated each diagnostic test in greater detail. At the time of the response, 52% for instrument inaccuracies was conservatively assumed when an open stroke within the calibration range had not been performed.

A number of motor-operated valves (MOVs) have been retested while assuring that the open direction force was within the calibration range. For the diagnostic test results that have opening data outside the calibration range, the test

engineer applied the methodology referenced in Liberty Technologies Customer Service Bulletin 31. This methodology quantified the uncertainty of force values outside of the calibration range. If the unwedging value was still overly conservative due to the uncertainties being too high, spring pack displacement was used to determine the unwedging value. The amount of spring pack displacement was evaluated at O9 (maximum force at disc pullout) and compared to a similar displacement between C11 (start of wedging) C16 (maximum thrust value). An uncertainty of 25% was then applied to determine the maximum open direction (unwedging) force.

The valve unwedging values have been adjusted to reflect more accurate data. As a result, the current calculation for pressure locking and thermal binding (PLTB) for valve 3RC-4 will show a different margin than that previously provided in the 180 day response. The margin for 3RC-4 continues to be acceptable.

Please see the calculation for the available thrust margin of 3RC-4 in Attachment 4.

Question 3

Through review of operational experience feedback, the staff is aware of instances where licensees have completed design or procedural modifications to preclude pressure locking or thermal binding that may have had an adverse impact on plant safety due to incomplete or incorrect evaluation of the potential effects of these modifications. Please describe evaluations and training for plant personnel that have been conducted for each design or procedural modification completed to address potential pressure locking or thermal binding concerns.

Response

Oconee Nuclear Station has completed 15 modifications to valves that were screened to be potentially susceptible to PLTB. The following is a list of the valve modifications which have been performed to date:

Valve No.	Modification Description
1HP-409	Replaced with globe valve.
1HP-410	Replaced with globe valve.
1LP-1	Provided relief hole in the upstream disc.

1LP-103	Provided relief hole in the upstream bridge wall.
1LP-104	Provided relief hole in the upstream bridge wall.
1LP-105	Provided relief hole in the upstream bridge wall.
2HP-409	Replaced with globe valve.
2HP-410	Replaced with globe valve.
2LP-1	Provided relief hole in the upstream disc.
2LP-2	Provided relief by means of 1/2" tubing from bonnet to upstream piping
2LP-3	Provided additional margin by changing actuator gearing and reduced the closing force by changing the switch closing logic to position seating.
2LPSW-4	Replaced with ball valve.
2LPSW-5	Replaced with ball valve.
2LPSW-137	Replaced with ball valve.
2SF-82	Provided additional margin by increasing motor size.
3LP-1	Provided relief hole in the upstream disc.

The Unit 2 LP-15, -16, Low Pressure Injection Valve stroking Procedure has been revised to remove the option of stroking these valves at temperatures above 200 °F. This procedural revision will alleviate thermal binding concerns for these valves.

Processes Which Address Design Impact of PLTB

Valve modifications are subjected to the modification process as described in Duke Nuclear Systems Directive (NSD) 301. All plant procedures are revised in accordance with the requirements specified in Duke NSD 703. In addition, Duke NSD 209 specifies the requirements for reviewing plant tests, changes, and procedures in accordance with the requirements of 10CFR50.59.

For both modifications and procedure changes, the potential for adverse impacts on plant safety are appropriately addressed by following the requirements of NSD 209. NSD 209 contains a comprehensive checklist of design and safety considerations which are reviewed when performing a 10CFR50.59 evaluation for plant modifications and procedures. This checklist is provided for your information in Attachment 5.

In addition to the barriers provided in the 10CFR50.59 process as implemented at Duke Power Company through NSD

209, other barriers exist which preclude modifications from resulting in adverse impacts on plant safety. NSD 301 requires each modification to be reviewed by various engineering disciplines to assure the technical adequacy of the modification and to assess the impact of the modification on the station. NSD 301 requires use of a comprehensive technical issues checklist during the early stages of development of engineering discipline-specific design input calculations for all major modifications to the station as well as minor modifications which are not form, fit, and function one-to-one replacements. This technical issues checklist was recently developed, therefore, it was not used for all the modifications listed above. However, discipline-specific MOV calculations provided assurance that all safety aspects of all of the modifications listed above were addressed. In addition, as a final design review for all minor modifications, a minor modification design input checklist is also used to assess whether or not all aspects of design have been reviewed. Engineering disciplines are trained on the use of both of these checklists. These checklists are provided for your information in Attachments 6 and 7.

The NSD 301 technical issues checklist and the minor modification design input checklist will be revised to include a review for the potential affects of PLTB for all power operated active valves that have a design basis requirement to open.

Processes Which Address Training Aspects

For valve modifications completed under the modification process, NSD 301 requires the originating site engineering organization to prepare a modification package for each modification. The modification package contains information such as the modification implementation schedule, impact on operator burden and operating procedures, impact on maintenance procedures, impact on licensing and design documentation, and other items affecting the site. Modification packages are distributed to virtually all site groups which have the potential to be impacted.

As an example, when the Operations Training Group receives modification packages, they are screened by a designated subject matter expert for applicability to plant operations procedures, plant configuration control, and other significant operational plant changes which may affect the activities of plant operators. For applicable modifications, the subject matter expert will then develop a training package, submit the package for Operations Training Staff review, and provide the training to all Operations

personnel. Through this organization-specific process, assurance is provided that all appropriate site personnel receive training for modifications. This process is similar for other site organizations.