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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Response to NRC Bulletin 88-11;
"Pressurizer Surge Line Thermal
Stratification", Action 1.a
(TAC No. M72109)

Gentlemen:

By letter 0CNA128827 (dated December 20, 1988), the NRC issued Bulletin 88-11 "Pressurizer Surge Line Thermal Stratification". The Action 1.a of the bulletin required Arkansas Nuclear One, Units 1&2 (ANO-1&2) to perform visual inspections (ASME, Section XI, VT-3) of the pressurizer surge lines at the first available cold shutdown after receipt of the bulletin which exceeded seven days. The inspections were to determine if any gross discernable distress or structural damage had occurred to the pressurizer surge line, including piping, pipe supports, pipe whip restraints, and anchor bolts. Reporting Requirement 1 of the bulletin required licensees to report any discernable distress and damage observed in Action 1.a along with corrective actions taken or plans and schedules for repair.

During the current, on-going project at ANO for performing a historical review of correspondence to and from the NRC, it was determined that ANO-2 had not reported certain evaluation findings under the Reporting Requirement 1 of NRC Bulletin 88-11. As discussed below, the results of the evaluation determined that the indications identified were not of such a nature that would have been caused by thermal stratification. Therefore, these indications were not initially reported to the NRC. However, in recent discussions with the NRR ANO Project Manager, the NRC Staff requested that the findings be reported to the NRC for completeness.

Provided below is a discussion of the results of the inspection not previously provided to the NRC.

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On January 9, 1989, a visual inspection of the ANO-2 surge line was initially performed. However, due to environmental conditions at the time of inspection and limited accessability due to pipe insulation, whip restraint gap verifications as well as potential pipe deformation verification was impossible. Therefore, a more comprehensive inspection of the line was judged to be needed which would allow sufficient time for the removal of pipe insulation to verify any distress or damage.

After cold shutdown for the seventh refueling outage (2R7), a series of walkdowns occurred beginning October 5, 1989. The intent of the walkdowns was to measure all the rupture restraint gaps (five restraints total) to ensure adequate clearance and to inspect for any damage to the surge line or restraints. Three of the restraints (MK-40, MK-45, and MK-37 East) showed adequate shimmed clearances with no indications of contact. However, the other 2 restraints (MK-37 South and MK-39) had signs of contact between the pipe whip impact blocks and shim plates.

All of the rupture restraints on the surge line are designed with four impact blocks welded to a clamp that is attached to the pipe. Gaps are provided between the impact blocks and the restraint steel to accommodate thermal growth. The MK-37 South impact blocks and clamp were discovered to be rotated out of the pipe whip axis and in contact with the lower shim. A review of pipe supports on the surge line indicated that MK-37 South also served as rigid Y restraint 2BCA-1-H1, with the bottom impact block bearing on the lower shim. When the RCS piping heats up, the surge line has a horizontal displacement (at this restraint location) of approximately 2" normal to the pipe. Rotation of the clamp was caused by the friction force between the impact block and shim (during RCS heatup) being greater than the clamping force of the clamp assembly. When the pipe moved back to the cold position, the impact block and clamp assembly remained rotated. The cause of the rotated clamp assembly was attributed to poor pipe support design of 2BCA-1-H1.

On restraint MK-39, the southwest shim and impact block showed signs of contact due to horizontal thermal growth. One side of the shim had a distinctive wear pattern (scuffed) that aligned with a wear pattern on the machining side of the impact block. The measured as-found cold gap was 9/16". A review of the thermal pipe movements on the southwest side indicated that 11/16" of clearance was required. Therefore, the pipe was being restrained approximately 1/8" during the latter stages of thermal growth. Cause of the contact was determined to be inadequate clearance provided by the original whip restraint design to allow for horizontal thermal growth.

Pipe support 2BCA-1-H1 was redesigned and repaired during 2R7 such that it no longer functions with pipe whip restraint MK-37 South. A gap was provided between the bottom impact block and shim on MK-37 South so that the lateral friction force causing clamp rotation was no longer present. Additionally, MK-39 was reshimmed during 2R7 to provide 11/16" of clearance so that contact between the impact block and the restraint was no longer possible.

A past operability evaluation was performed on the surge line to determine if the surge line would have remained operable during a postulated seismic event. The evaluation assumed rigid Y support 2BCA-1-H1 as being inactive as well as MK-39 providing lateral restraint. The evaluation concluded that the surge line piping and nozzles would have remained operable during a seismic event.

A "damage assessment" evaluation of the surge line was also performed to determine if these conditions accelerated fatigue life. Results from the evaluation demonstrated that no additional fatigue life had been accumulated. This evaluation also determined that these support problems did not invalidate any of the thermal stratification analysis results. The stratification analysis evaluated the surge line with Y support 2BCA-1-H1 installed and not installed. The installed configuration was bounding and was utilized in evaluation of fatigue life. As far as contact with MK-39, most of the horizontal movement at this location is due to Hot Leg thermal anchor movements. Contact with this restraint is not present during the primary stratification transients since the hot leg is at a lower temperature and has not moved through its full range of motion.

In accordance with the requirements of 10CFR50.54(f), this letter is being provided under oath. Should you have any questions regarding our response to this issue, please contact me.

Very truly yours,

Dale E. James

for James J. Fisicaro
Director, Licensing

JJF/RWC/sjf

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STATE OF ARKANSAS)
) SS
COUNTY OF LOGAN)

I, Dale E. James, being duly sworn, subscribe to and say that I am Supervisor, Licensing at ANO for Entergy Operations, that I have full authority to execute this oath; that I have read the document numbered 2CAN089209 and know the contents thereof; and that to the best of my knowledge, information and belief the statements in it are true.

Dale E. James

SUBSCRIBED AND SWORN TO before me, a Notary Public in and for the County and State above named, this _____ day of _____, 1992.

Notary Public

My Commission Expires:

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