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

Perry Nuclear Power Plant
Docket No. 50-440
10CFR21 Notification, Defects
in MSIV Poppets Supplied by A&M

Gentlemen:

This letter is submitted pursuant to the requirements of 10CFR21.21(c)(3)(ii) to report defects in Main Steam Isolation Valve (MSIV) poppets supplied by Atwood and Morrill Company, Incorporated (A&M). An extensive evaluation was performed to determine the source of deviations observed in MSIV poppets received at the Perry Nuclear Power Plant (PNPP). On May 21, 1992, the evaluation concluded that these deviations constituted defects under 10CFR21. A preliminary notification regarding the subject defects was transmitted to the NRC Operations Center on May 22, 1992 by facsimile.

Chronology

A total of eleven (11) poppets were ordered from A&M as part of a design improvement for the MSIVs at the Perry Power Plant. Nine of eleven poppets were received during the three month period from September 5, to December 3, 1991.

On April 1, 1992, a linear indication was observed in the Stellite 21 hardfaced seating surface of a poppet identified as serial number (S/N) 5. A Nonconformance Report (NR) was issued to document the deficiency and the poppet was returned to A&M for repair. The remaining 8 poppets were visually inspected prior to April 5, 1992 and revealed no signs of cracking.

On April 8, 1992, at 1000 hours, a crack which ran across the seating surface and approximately 1/3 of the circumference in the relief area was discovered on poppet S/N 4. By 1130 hours, the crack had traveled approximately 1/2 the circumference within the relief area. Subsequent visual and liquid penetrant testing of the other poppets revealed cracks in poppets S/N 6 and

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S/N 12. All poppets with identified cracking (S/Ns 4, 5, 6 and 12) were returned to A&M for repair. A hold was placed on the shipment of two poppets (S/N 2 and S/N 9) which were still in the fabrication stage, pending an evaluation of the cracking problem. A&M was requested to provide a root cause analysis to identify the source of the cracking and to provide justification to support the use of poppets which did not experience cracking.

Apparent Cause

The analysis performed by A&M concluded that the post-production cracking in the hardfaced material was caused by excessive build-up of residual stresses during repair activities and/or a substantial increase in the overall thickness of the Stellite 21 hardfacing.

The initial repairs made to S/Ns 4, 5, and 6, during the production run, involved the entire removal of the original hardfacing and some of the base material. The re-welding was done entirely with Stellite 21. This resulted in the overall thickness of the new hardfacing being thicker than originally designed. Two initial repairs to S/N 12 involved localized repairs as opposed to entire hardfacing removal. In summary, A&M did not tailor their repair methods towards preserving the original design hardfacing thickness during the production phase. It is also possible that the type of heat treatment given to the poppets prior to hardfacing had an influence on limiting the capability of the poppets to tolerate multiple repairs.

Corrective Actions

The absence of multiple weld repair histories and the preservation of the original design hardfacing thickness formed the basis for determining the acceptability for service of the poppets which did not experience cracking (S/Ns 3, 7, 8, 9, 10 and 11). Although poppet S/N 11 did not exhibit cracking, the poppet had experienced one major repair in the nose/seating area. Post weld heat treatment was performed to alleviate concerns regarding residual stresses which may have been present. Poppet S/N 9 was also repaired utilizing post-weld heat treatment to minimize residual stresses.

Poppet S/Ns 3, 7, 8, 9, 10 and 11 were installed in the plant during Refuel Outage (RFO) 3, which ended on June 13, 1992. An additional poppet S/N 4 was repaired by A&M and returned to PNPP on May 7, 1992. Poppets S/Ns 2, 5, 6 and 12 currently reside at A&M, pending satisfactory completion of repairs.

Measures will be established to ensure that adequate repair methods are employed during future repairs of the modified MSIV poppets. These include a requirement to provide a documented evaluation of repairs as part of the receipt inspection process and vendor manual changes to ensure that future MSIV

poppet weld repairs include appropriate stress relief heat treatments when required. These measures will be in place prior to the next scheduled refueling outage.

Sincerely,

Michael D. Lyster

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cc: NRC Project Manager
NRC Resident Inspector Office
NRC Region III Administrator