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A. Edward Scherer
Director
Nuclear Regulatory Affairs

November 19, 2008

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: **Docket No. 50-362**
Status of Embedded Flaw Repair Process for Reactor Vessel Head Penetration # 64
San Onofre Nuclear Generating Station Unit 3

References: (See Attachment)

Dear Sir or Madam,

This letter is to provide written notification to the NRC of an indication found during the surface examination of the seal weld on the reactor vessel head penetration (RVHP) for the control element drive mechanism (CEDM) # 64. The NRC safety evaluation (Reference 1) for WCAP-15987-P (Reference 2) includes a condition that requires licensees to notify the NRC of changes in the original flaw(s) or finding of any new flaw(s) in the J-groove weld beneath or in the seal weld repair. This letter also provides Southern California Edison's (SCE) technical assessment and resolution of the indication.

BACKGROUND

During the San Onofre Nuclear Generating Station (SONGS) Unit 3 Reactor Pressure Vessel Head (RPVH) inspection in 2004, an embedded flaw repair weld was installed to address crack like indications in the base metal of CEDM # 32, # 57, and # 64 penetrations[1] discovered by ultrasonic testing (UT). To restore these penetrations to service, SCE employed Relief Request ISI-3-8 (Reference 3) in accordance with the NRC approved Westinghouse embedded flaw repair topical report WCAP-15987-P.

The NRC safety evaluation (Reference 4) for Relief Request ISI-3-8 and First Revised NRC Order EA-03-009 (Reference 5) require that embedded flaw repair weld surfaces are examined each refueling outage. In accordance with those requirements, the repair welds of CEDM # 32, # 57 and # 64 were examined prior to returning to service in 2004, and again during the cycle-14 refueling outage two years later. No defects were observed in the inspections performed in 2004 and 2006.

[1] CEDM # 56 also received an overlay seal weld but is not a repair under ISI-3-8.

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A dye penetrant examination (PT) of the CEDM # 64 repair weld was repeated in the current cycle-15 refueling outage on October 30, 2008, following two cycles of operation. That examination revealed a rejectable, rounded indication in the J-weld overlay adjacent to the penetration on the uphill side, approximately 180 degrees away from the location of the original UT indication. The defect was not acceptable per the inservice inspection requirement of ISI-3-8 and required remedial action. The PT of CEDM # 32 and # 57 revealed no defects.

The NRC safety evaluation for WCAP-15987-P requires licensees to notify the NRC of changes in the original flaw(s) or finding of any new flaw(s) in the J-groove weld beneath or in the seal weld repair. SCE provided verbal notification of the October 30, 2008 CEDM # 64 PT results during a teleconference on October 31, 2008. This letter documents the actions taken to ensure continued acceptability of the embedded flaw repair and to restore CEDM # 64 to the requirements specified in ISI-3-8 and WCAP-15987-P.

INVESTIGATION

The location of the defect is in an area where Alloy 52 seal weld beads were started and stopped. The industry recognizes such locations as being prone to weld porosity and fusion issues. Original work records and grinding marks on the original weld surface at the defect location document that PT indications had been present and corrected during the embedded flaw repair in 2004.

The 180 degree separation between this PT indication and the original base metal flaw is sufficient to rule out interaction or degraded effectiveness of the seal weld to arrest an embedded primary water stress corrosion cracking (PWSCC) flaw. Similarly, the appearance of this new PT defect is not a result of propagation of the original base metal flaw into the seal weld. This is validated by UT of the original flaw that has confirmed no discernable change since it was first identified in 2004.

On November 1, 2008 SCE performed a replication of the external defect surface and observed it to be an irregularly shaped weld pore roughly $1/16^{th}$ inch in diameter and $1/32^{nd}$ inch in depth. SCE subsequently performed shallow grinding to blend the observed pore flush with the surrounding surfaces while preserving the pore bottom. That operation failed to eliminate the rejectable PT indication.

Although fabrication flaws are thought to be the root source of the observed defect in CEDM # 64, SCE decided to extract a boat sample of the affected weld volume to better understand the anomalous condition and why it has taken two operating cycles to become evident. The destructive examination results may have generic benefit on future Alloy 52 application and inspection techniques.

RESTORATION

On November 13, 2008 SCE removed the defect through extraction of a boat sample using remotely controlled electric discharge machining equipment. The resultant cavity was prepared for welding by grinding, was examined by PT and was found to be free of indications. One American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code acceptable rounded indication was discovered slightly outside the boundary of the cavity. A weld repair of the cavity was then performed under SCE's ASME B&PV, Section XI repair program to restore the embedded flaw seal weld to the requirements of ISI-3-8. The post repair weld surface was examined by PT and met the acceptance standards from ASME NB-5352 as required by the safety evaluation for WCAP-15987-P.

SUMMARY

The apparent cause of the rejectable indication was original weld fabrication flaws. SCE removed the defect and restored the CEDM # 64 to compliance with ISI-3-8. These corrective actions ensure acceptability of the embedded flaw repair performed in 2004.

RETURN TO SERVICE AND FOLLOW UP EVALUATIONS

SCE currently plans to replace the RPVH for both Units 2 and 3 during their respective cycle-17 refueling outages. Until that time, SCE will perform surface examinations on the repair welds of CEDM # 32, # 57 and # 64 as required by ISI-3-8. Based on restoration of CEDM # 64, SCE intends to return Unit 3 to service.

As a separate, ongoing effort, SCE along with industry and NRC representatives will analyze the boat sample to determine the cause of the indication.

Should you have any questions, please contact Ms. Linda T. Conklin at (949) 368-9443.

Sincerely,

Loyd A. Wright for

Attachment: List of References

cc: E. E. Collins, Regional Administrator, NRC Region IV
N. Kalyanam, NRC Project Manager, San Onofre Units 2 and 3
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3

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References

1) Letter from Herbert N. Berkow (NRC) to Henry A. Sepp (Westinghouse) dated July 3, 2003; Subject: Acceptance For Referencing – Topical Report WCAP-15987-P, Revision 2, "Technical Basis For The Embedded Flaw Process For Repair Of Reactor Vessel Head Penetrations," (TAC No. MB 8997)

2) Topical Report WCAP-15987-P, Revision 2, "Technical Basis For The Embedded Flaw Process For Repair Of Reactor Vessel Head Penetrations

3) Letter from A. E. Scherer (SCE) to the U. S. Nuclear Regulatory Commission dated December 3, 2003; Subject: Docket Nos. 50-361 and 50-362, Third Ten-Year Inservice Inspection (ISI) Interval Relief Request ISI-3-8 Request to Use Alternative To ASME Code Rules For The Embedded Flaw Repair Process San Onofre Nuclear Generating Station Units 2 and 3

4) Letter from Stephen Dembek (NRC) to A. E. Scherer (SCE) dated May 5, 2004; Subject: San Onofre Nuclear Generating Station, Units 2 and 3, Inservice Inspection Program Relief Request ISI-3-8, Embedded Flaw Repair Process (TAC Nos. MC1470 and MC1471)

5) First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors, issued on February 20, 2004