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Manager of
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February 25, 2005

Document Control Desk
U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C., 20555-0001

Subject: **Docket No. 50-362**
60-day Post Refueling Outage Reactor Pressure Vessel Head Inspection Report for San Onofre Nuclear Generating Station, Unit 3

Reference: EA-03-009, Subject: "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads At Pressurized Water Reactors", dated February 20, 2004

Dear Sir or Madam:

This letter provides the Southern California Edison Company (SCE) 60-day post refueling outage response to First Revised NRC Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads At Pressurized Water Reactors" for San Onofre Nuclear Generating Station, Unit 3.

As required by First Revised NRC Order EA-03-009, SCE completed inspections of the Reactor Pressure Vessel Head (RPVH) penetrations during the Unit 3 Cycle 13 refueling outage, which ended on December 28, 2004.

In summary, SCE performed a bare metal visual inspection of the RPVH surface including 360 degrees around all 102 RPVH penetrations, Non Destructive Examination (NDE) Ultrasonic Test (UT) and leak path assessment of all 91 Control Element Drive Mechanism (CEDM) nozzles and all 10 In-Core Instrument (ICI) nozzles, and NDE eddy current testing of the wetted surface of the vent line penetration. Visual inspections were also performed to identify potential boric acid leaks from pressure-retaining components above the RPVH. In addition to the requirements of the First Revised Order, supplementary surface examinations were performed on the J-groove attachment welds of all 91 CEDM nozzles and on the inside diameter (ID) surfaces of all 91 CEDM and ten ICI penetrations.

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No through-wall leakage was identified at any reactor vessel head penetration, no boric acid leaks were identified from pressure-retaining components above the RPVH, no deposits were found on RPVH surfaces, and no degradation of reactor vessel head base material was identified during the performance of these inspections at San Onofre Nuclear Generating Station (SONGS) Unit 3. Ultrasonic testing identified primary water stress corrosion crack like indications in four CEDM nozzles. As a result, weld overlay repairs were performed on the SONGS Unit 3 RPVH. The enclosure provides additional details of the specific inspection and repair activities. Also, please note that a change to SCE future inspection plans is discussed in the enclosed report.

If you have any questions or would like additional information concerning this subject, please call Mr. Jack Rainsberry (949) 368-7420.

Sincerely,

Enclosure

cc: B. S. Mallett, Regional Administrator, NRC Region IV
B. M. Pham, NRC Project Manager, San Onofre Units 2 and 3
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 and 3

Enclosure

60-day Post Refueling Outage
Reactor Pressure Vessel Head Inspection Report for
San Onofre Nuclear Generating Station, Unit 3 Cycle 13

References:

1. EA-03-009, Subject: "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads At Pressurized Water Reactors", dated February 20, 2004

2. Letter from Herbert N. Berkow (NRC) to Harold B. Ray (SCE); Subject: "Relaxation of the Requirements of Order EA-03-009 Regarding Reactor Pressure Vessel Head Inspections, San Onofre Nuclear Generating Station (SONGS), Units 2 and 3 (TAC Nos. MC1542 AND MC1543), dated March 19, 2004

3. NRC letter, S. Dembeck to A. Scherer, "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)", dated May 5, 2004

4. NRC letter, R. A. Grahm to H. B. Ray, "San Onofre Nuclear Generating Station (SONGS) Unit 3- RE: Request for Relief from Requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (CODE) Concerning Reactor Vessel Head Penetration (RVHP) Repairs (TAC NO. MC4969)", dated December 23, 2004

The following activities were completed for the San Onofre Nuclear Generating Station (SONGS) Unit 3 reactor head during the Cycle 13 refueling outage:

Using the specified equation in accordance with EA-03-009 part IV.A, Southern California Edison (SCE) calculated the susceptibility category of the SONGS Unit 3 Reactor Pressure Vessel Head (RPVH) to Primary Water Stress Corrosion Cracking (PWSCC) related degradation. This susceptibility category is represented by a value of effective degradation years (EDY) for the end of each operating cycle. As of the end of the Cycle 12 fuel cycle the calculated value for SONGS Unit 3 was 16.2 EDY.

In accordance with EA-03-009 part IV.B, SCE assigned SONGS Unit 3 to the High PWSCC susceptibility category.

In accordance with EA-03-009 part IV.C (1), SCE performed RPVH and head penetration nozzle inspections using the techniques of paragraph IV.C.(5)(a) and paragraph IV.C.(5)(b).

In accordance with EA-03-009 paragraph IV.C.(5)(a), a bare metal visual examination of no less than 95 percent of the RPVH surface (including 360° around each head penetration nozzle) was performed. The RPVH surface was found in good condition and there were no indications of any degradation or measurable boric acid deposits. SCE confirmed that the surface obscured by support structure interferences which are located at RPVH elevations downslope from the outermost RPVH penetration constitute less than 5 percent of the RPVH surface. SCE inspected those areas of the RPVH upslope and downslope from the support structure interferences. There was no evidence of boric acid or degradation of the RPVH material in any of these areas.

In accordance with EA-03-009 paragraph IV.C.(5)(b), non-visual NDE was performed on each of the 102 penetrations as described below:

Head Vent Line

The vent line was examined in accordance with method (ii), using Eddy Current Testing (ET). The ET examination included the entire wetted surface of the J-groove weld and the wetted penetration inside diameter (ID) surface to at least 2 inches above the highest point of the root of the J-groove weld. The inspection probes for both the weld surface and the vent line penetration surfaces were delivered manually. No indications of PWSCC were identified as a result of this head vent line inspection.

CEDM penetrations

All 91 Control Element Drive Mechanism (CEDM) penetrations were examined in accordance with method (i), Ultrasonic Testing (UT). The effective inspection coverage above the root and below the toe of the weld for each nozzle is provided in Attachment 1. There were no exceptions to the minimum inspection distances approved for SONGS Unit 3 in Relaxation Request #2 (Reference 2). A supplemental outside diameter (OD) UT examination was required to achieve the minimum inspection distance below the toe of the weld for CEDM #90. Using UT, an assessment of the annulus between each CEDM penetration and the RPVH determined that no leakage path had developed.

Penetrations 32, 56, 57, and 64 were found to have non-through wall, axially oriented UT indications connected to the wetted surface of the penetration OD. These UT indications extended from below the toe of the J-groove weld in the penetration tube to an elevation above the toe of the

J-groove weld. The maximum upper extent of any indication was at least 0.40 inches below the root of the J-groove weld.

During the Unit 3 Cycle 12 refueling outage, similar indications in these penetrations were evaluated using data analysis techniques or surface examinations and were concluded not to be indicative of PWSCC. However, the Cycle 13 examination results had shown an apparent change in both length and depth of these indications from the Cycle 12 data. Based on the apparent growth and detection uncertainties, it was conservatively decided to perform embedded flaw repairs. The repairs applied an Alloy 52 weld overlay to the J-groove attachment weld surface and the penetration OD surface on all four CEDM penetrations. The repairs for CEDMs 32, 57, and 64 were made in accordance with an approved Code Relief Request (Reference 3). CEDM 56 required a separate Code relief (Reference 4) to address flaw characteristics not bounded by Reference 3.

In addition to the examinations required by EA-03-009, supplemental ET surface examinations of the inside diameters of all 91 CEDM penetrations were performed and supplemental ET surface examinations of all 91 CEDM J-groove attachment welds were performed. No PWSCC was identified by these supplemental examinations. SCE does not plan to continue performing supplemental J-groove surface examinations in the future since comparative analysis of UT examination results against baseline data provides an effective supplementary analysis technique.

Incore Instrument (ICI) penetrations

All ten ICI penetrations were examined in accordance with method (i), UT examinations. These inspections included UT from the ID surface and from the ICI bottom face such that the entire ICI penetration nozzle volume was examined, from at least 2 inches above the highest point of the root of the J-groove weld to the bottom of the nozzle. In addition to the examinations required by EA-03-009, supplemental ET surface examinations of the inside diameters of all ten ICI penetrations were performed and supplemental ET surface examinations of all ten ICI bottom face surfaces were performed. No indications of PWSCC were identified as a result of these inspections. Using UT, an assessment of the annulus between each ICI penetration and RPVH determined that no leakage path had developed.

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In accordance with EA-03-009 part IV.D, visual inspections were performed to identify potential boric acid leaks from pressure-retaining components above the RPV head. There were no indications of any boric acid leakage identified.

In accordance with EA-03-009 part IV.E, SCE submits this report within 60 days after returning the plant to operation.

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Attachment 1: Measured Weld Coverage

Penetration #	Min Below Weld	Meas. Below Weld	Min Above Weld	Meas Above Weld	Penetration #	Min Below Weld	Meas Below Weld	Min Above Weld	Meas Above Weld
1 CEDM	0.44	1.44	2.00	4.24	52 CEDM	0.42	0.72	2.00	4.32
2 CEDM	0.43	1.32	2.00	4.44	53 CEDM	0.42	0.96	2.00	3.60
3 CEDM	0.43	1.16	2.00	3.88	54 CEDM	0.42	0.84	2.00	3.60
4 CEDM	0.43	1.40	2.00	7.20	55 CEDM	0.42	0.96	2.00	3.40
5 CEDM	0.43	1.36	2.00	3.64	56 CEDM	0.42	1.16	2.00	3.40
6 CEDM	0.43	1.00	2.00	6.28	57 CEDM	0.42	1.30	2.00	4.92
7 CEDM	0.43	1.24	2.00	3.68	58 CEDM	0.42	0.80	2.00	4.08
8 CEDM	0.43	1.28	2.00	6.96	59 CEDM	0.42	0.80	2.00	4.16
9 CEDM	0.43	1.20	2.00	6.96	60 CEDM	0.42	0.84	2.00	4.64
10 CEDM	0.43	1.08	2.00	3.92	61 CEDM	0.42	0.88	2.00	4.40
11 CEDM	0.43	1.20	2.00	5.00	62 CEDM	0.42	0.84	2.00	5.20
12 CEDM	0.43	1.32	2.00	6.80	63 CEDM	0.42	0.68	2.00	3.44
13 CEDM	0.43	1.36	2.00	3.64	64 CEDM	0.42	0.80	2.00	4.92
14 CEDM	0.43	1.08	2.00	6.76	65 CEDM	0.42	0.80	2.00	3.76
15 CEDM	0.43	1.36	2.00	6.72	66 CEDM	0.42	0.88	2.00	3.64
16 CEDM	0.43	1.28	2.00	5.80	67 CEDM	0.42	0.92	2.00	3.64
17 CEDM	0.43	1.16	2.00	3.96	68 CEDM	0.42	0.84	2.00	3.60
18 CEDM	0.43	1.36	2.00	3.80	69 CEDM	0.42	0.64	2.00	3.80
19 CEDM	0.43	1.28	2.00	4.80	70 CEDM	0.42	0.60	2.00	4.84
20 CEDM	0.43	1.20	2.00	4.24	71 CEDM	0.42	0.64	2.00	4.80
21 CEDM	0.43	1.16	2.00	6.32	72 CEDM	0.42	0.72	2.00	3.40
22 CEDM	0.43	1.04	2.00	6.32	73 CEDM	0.42	0.64	2.00	3.80
23 CEDM	0.43	1.28	2.00	3.64	74 CEDM	0.42	0.68	2.00	3.84
24 CEDM	0.43	1.16	2.00	6.40	75 CEDM	0.42	0.68	2.00	4.12
25 CEDM	0.43	1.12	2.00	4.00	76 CEDM	0.42	0.72	2.00	4.08
26 CEDM	0.43	1.12	2.00	8.70	77 CEDM	0.42	0.68	2.00	3.92
27 CEDM	0.43	1.12	2.00	3.60	78 CEDM	0.42	1.04	2.00	4.20
28 CEDM	0.43	1.08	2.00	6.08	79 CEDM	0.42	0.84	2.00	4.13
29 CEDM	0.43	1.24	2.00	3.36	80 CEDM	0.42	0.52	2.00	3.72
30 CEDM	0.43	1.12	2.00	3.84	81 CEDM	0.42	0.76	2.00	3.64
31 CEDM	0.43	1.12	2.00	3.92	82 CEDM	0.42	0.80	2.00	3.28
32 CEDM	0.43	1.16	2.00	4.12	83 CEDM	0.42	0.60	2.00	3.48
33 CEDM	0.43	0.92	2.00	3.48	84 CEDM	0.42	0.60	2.00	3.52
34 CEDM	0.43	1.16	2.00	3.96	85 CEDM	0.42	0.60	2.00	3.76
35 CEDM	0.43	0.96	2.00	4.04	86 CEDM	0.42	0.60	2.00	4.12
36 CEDM	0.42	0.76	2.00	5.68	87 CEDM	0.42	0.56	2.00	4.20
37 CEDM	0.42	0.68	2.00	5.60	88 CEDM	0.35	0.52	2.00	2.64
38 CEDM	0.42	1.08	2.00	4.60	89 CEDM	0.35	0.36	2.00	3.36
39 CEDM	0.42	0.88	2.00	3.52	90 CEDM	0.35	0.40 *	2.00	4.56
40 CEDM	0.42	0.80	2.00	5.88	91 CEDM	0.35	0.36	2.00	3.08
41 CEDM	0.42	1.12	2.00	3.72	92 ICI	N/A	N/A	2.00	4.12
42 CEDM	0.42	1.08	2.00	3.60	93 ICI	N/A	N/A	2.00	4.40
43 CEDM	0.42	0.96	2.00	3.80	94 ICI	N/A	N/A	2.00	4.12
44 CEDM	0.42	0.92	2.00	3.52	95 ICI	N/A	N/A	2.00	2.98
45 CEDM	0.42	0.88	2.00	3.56	96 ICI	N/A	N/A	2.00	3.72
46 CEDM	0.42	0.84	2.00	4.40	97 ICI	N/A	N/A	2.00	3.28
47 CEDM	0.42	0.60	2.00	3.68	98 ICI	N/A	N/A	2.00	3.32
48 CEDM	0.42	0.92	2.00	5.12	99 ICI	N/A	N/A	2.00	3.28
49 CEDM	0.42	0.60	2.00	3.56	100 ICI	N/A	N/A	2.00	4.24
50 CEDM	0.42	1.04	2.00	3.24	101 ICI	N/A	N/A	2.00	2.52
51 CEDM	0.42	0.84	2.00	3.44	Vent line	N/A	N/A	2.00	9.00

* OD Examination required to supplement ID inspection coverage below the weld.