SOUTHERN CALIFORNIA
EDISON®
An EDISON INTERNATIONAL® Company

Proprietary Information
Withhold from Public Disclosure

Richard J. St. Onge
Director, Nuclear Regulatory Affairs and
Emergency Planning

January 9, 2013 10 CFR 50.4

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

Subject: **Docket No. 50-361**
Response to Request for Additional Information (RAI 15)
Regarding Confirmatory Action Letter Response
(TAC No. ME 9727)
San Onofre Nuclear Generating Station, Unit 2

References:
1. Letter from Mr. Elmo E. Collins (USNRC) to Mr. Peter T. Dietrich (SCE), dated March 27, 2012, Confirmatory Action Letter 4-12-001, San Onofre Nuclear Generating Station, Units 2 and 3, Commitments to Address Steam Generator Tube Degradation

2. Letter from Mr. Peter T. Dietrich (SCE) to Mr. Elmo E. Collins (USNRC), dated October 3, 2012, Confirmatory Action Letter – Actions to Address Steam Generator Tube Degradation, San Onofre Nuclear Generating Station, Unit 2

3. Letter from Mr. James R. Hall (USNRC) to Mr. Peter T. Dietrich (SCE), dated December 26, 2012, Request for Additional Information Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

Dear Sir or Madam,

On March 27, 2012, the Nuclear Regulatory Commission (NRC) issued a Confirmatory Action Letter (CAL) (Reference 1) to Southern California Edison (SCE) describing actions that the NRC and SCE agreed would be completed to address issues identified in the steam generator tubes of San Onofre Nuclear Generating Station (SONGS) Units 2 and 3. In a letter to the NRC dated October 3, 2012 (Reference 2), SCE reported completion of the Unit 2 CAL actions and included a Return to Service Report (RTSR) that provided details of their completion.

By letter dated December 26, 2012 (Reference 3), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 2 of this letter provides the response to RAI 15.

Enclosure 2 of this submittal contains proprietary information. SCE requests that this proprietary enclosure be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4). Enclosure 1 provides a notarized affidavit from Mitsubishi Heavy Industries (MHI), which sets forth the basis on which the information in Enclosure 2 may be withheld from public disclosure

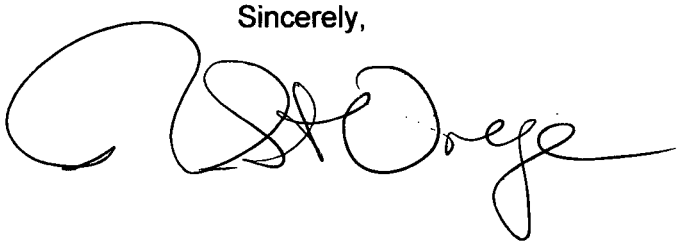
P.O. Box 128
San Clemente, CA 92672

JE36
NRR

by the NRC and addresses with specificity the considerations listed by paragraph (b)(4) of 10 CFR 2.390. Proprietary information identified in Enclosure 2 was extracted from the source document MHI Report L5-04GA561, Retainer Bar Tube Wear Report, which is addressed in the affidavit. Enclosure 3 provides the non-proprietary version of Enclosure 2.

There are no new regulatory commitments contained in this letter. If you have any questions or require additional information, please call me at (949) 368-6240.

Sincerely,



Enclosures:

1. Notarized Affidavit
2. Response to RAI 15 (Proprietary)
3. Response to RAI 15 (Non-proprietary)

cc: E. E. Collins, Regional Administrator, NRC Region IV
R. Hall, NRC Project Manager, San Onofre Units 2 and 3
G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3
R. E. Lantz, Branch Chief, Division of Reactor Projects, NRC Region IV

ENCLOSURE 1

Notarized Affidavit

MITSUBISHI HEAVY INDUSTRIES, LTD.

AFFIDAVIT

I, Jinichi Miyaguchi, state as follows:

1. I am Director, Nuclear Plant Component Designing Department, of Mitsubishi Heavy Industries, Ltd. ("MHI"), and have been delegated the function of reviewing the referenced MHI technical documentation to determine whether it contains information that should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4) as trade secrets and commercial or financial information that is privileged or confidential.

2. In accordance with my responsibilities, I have determined that the following MHI documents and drawings contain MHI proprietary information that should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4). The drawings in their entirety are proprietary and those pages of the documents containing proprietary information have been bracketed with an open and closed bracket as shown here "[ ]" / and should be withheld from public disclosure.

   MHI documents and drawings
   Document: L5-04GA561, L5-04GA564, L5-04GA571, L5-04GA585, L5-04GA591
   Drawings: L5-04FU101 thru 108

3. The information identified as proprietary in the enclosed document has in the past been, and will continue to be, held in confidence by MHI and its disclosure outside the company is limited to regulatory bodies, customers and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and is always subject to suitable measures to protect it from unauthorized use or disclosure.

4. The basis for holding the referenced information confidential is that it describes unique design, manufacturing, experimental and investigative information developed by MHI and not used in the exact form by any of MHI's competitors. This information was developed at significant cost to MHI, since it is the result of an intensive MHI effort.

5. The referenced information was furnished to the Nuclear Regulatory Commission ("NRC") in confidence and solely for the purpose of information to the NRC staff.

6. The referenced information is not available in public sources and could not be gathered readily from other publicly available information. Other than through the provisions in paragraph 3 above, MHI knows of no way the information could be lawfully acquired by organizations or individuals outside of MHI.

7. Public disclosure of the referenced information would assist competitors of MHI in their design and manufacture of nuclear plant components without incurring the costs or risks associated with the design and the manufacture of the subject component. Therefore, disclosure of the information contained in the referenced document would have the following negative impacts on the competitive position of MHI in the U.S. and world nuclear markets:

   A. Loss of competitive advantage due to the costs associated with development of technologies relating to the component design, manufacture and examination. Providing public access to such information permits competitors to duplicate or mimic the methodology without incurring the associated costs.

   B. Loss of competitive advantage of MHI's ability to supply replacement or new heavy components such as steam generators.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information and belief.

Executed on this 2 day of August, 2012.

Jinichi Miyaguchi

Jinichi Miyaguchi,
Director- Nuclear Plant Component Designing Department
Mitsubishi Heavy Industries, LTD

220

AUG. -2. 2012

Masaniko Kubota
Kobe District Legal Affairs Bureau
NOTARY
44 Akashimachi, Chuo-ku
Kobe, Japan

Sworn to and subscribed

Before me this 2 day

of August, 2012

Masahiko Kubota

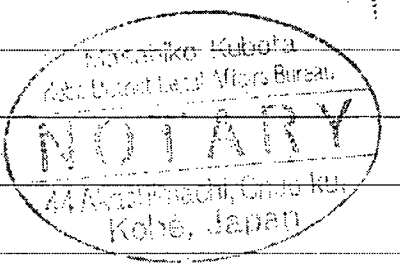
Notary Public

My Commission Expires _____

登簿平成２４年第２２０号

認　　証

嘱託人　三菱重工業株式会社　原子力事業部　原子力誠三総括部　原子力機器設計部　部長　宮口仁一　は本職の面前で添付書面に　署名　した。



よって認証する。

平成２４年８月２日

本職役場に於て

神戸市中央区明石町４４番地

神戸地方法務局所属

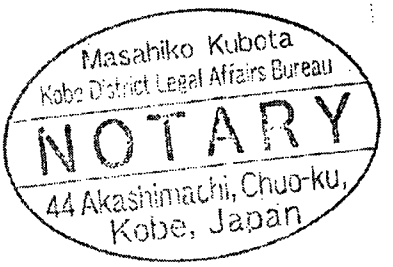
公証人　窪田正彦

公　証　人　役　場

Registered Number 220 Date AUG. -2. 2012

NOTARIAL CERTIFICATE

This is to certify that **JINICHI MIYAGUCHI , Director-Nuclear Plant Component Designing Department MITSUBISHI HEAVY INDUSTRIES, LTD** has affixed his signature in my very presence to the attached document.



Masahiko Kubota

MASAHIKO KUBOTA

Notary

44 Akashimachi, Chuo-Ku,

Kobe, Japan

Kobe District Legal Affairs Bureau

(面前法2)

ENCLOSURE 3

SOUTHERN CALIFORNIA EDISON

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

REGARDING RESPONSE TO CONFIRMATORY ACTION LETTER

DOCKET NO. 50-361

TAC NO. ME 9727

Response to RAI 15

(NON-PROPRIETARY)

RAI 15

In Reference 1, Section 8.3.2, page 48 – How will the continued integrity of the non-stabilized, preventively-plugged tubes adjacent to the retainer bars be ensured? "Integrity" in this context refers to the tubes remaining intact and unable to cause damage to adjacent tubes.

RESPONSE

The integrity of the non-stabilized, preventively-plugged tubes is ensured by limiting the wear resulting from retainer bar vibration. The limited vibration amplitude of the tubes and retainer bars, combined with stabilizer deployment, prevents developing a displacement/wear geometry that could sever any of the tubes adjacent to retainer bars, either in the short term or long term.

Wear mechanism of tubes adjacent to retainer bars

There are 94 tubes in each steam generator adjacent to retainer bars. Each of these tubes has 7 hot leg tube support plate (TSP) support locations, 12 anti-vibration bar (AVB) support locations, and 7 cold leg TSP support locations. All 188 of these tubes in the Unit 2 steam generators (94 tubes per steam generator) were examined. No evidence of wear was found on any of these tubes at AVB and TSP intersections. Retainer bar wear was found on a total of 6 tubes with 7 wear locations (one tube in SG 2E-089, Row 120 Column 132, had retainer bar wear at two retainer bar locations, remaining 5 tubes had retainer bar wear at one location). The maximum wear depth of 90% tube wall thickness was found on SG 2E-089, Row 119 Column 133, in a location adjacent to a retainer bar.

The cause of tube wear at retainer bar locations has been evaluated by MHI. Wear marks at the AVB intersections would be evidence of out-of-plane displacement of the U-bend. Wear marks on the TSP intersections, especially the top TSP, would be evidence of in-plane displacement of the U-bend. The absence of wear at the AVBs and TSPs of all 188 tubes adjacent to the retainer bar is evidence that the tubes adjacent to the retainer bar are not vibrating. MHI concluded that the tube wear adjacent to retainer bars is caused by retainer bar vibration rather than tube vibration.

During steam generator operation, retainer bars are subject to flow induced vibration. MHI's analysis of the dynamic response of retainer bars to operating conditions found that the vibration amplitude is limited and much smaller than the tube diameter of 0.75". Consequently, these retainer bar motions may damage the wall of an adjacent tube but cannot sever these tubes. The retainer bar natural frequencies and vibration amplitudes for the first five modes are shown in Table 1 and the lowest three mode shapes are shown in Figure 1. The first mode moves in a direction parallel to the tubes. The second and third retainer bar modes are perpendicular to adjacent tubes. The maximum amplitude of the first mode due to steam generator operating conditions is between [ ]. Maximum amplitude of the second mode during steam generator operating conditions is between [ ]. All higher modes have negligible vibration amplitudes.

Table 1 - Retainer Bar Natural Frequencies and Vibration Amplitudes

	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5
Frequency, Hz					
Amplitude					

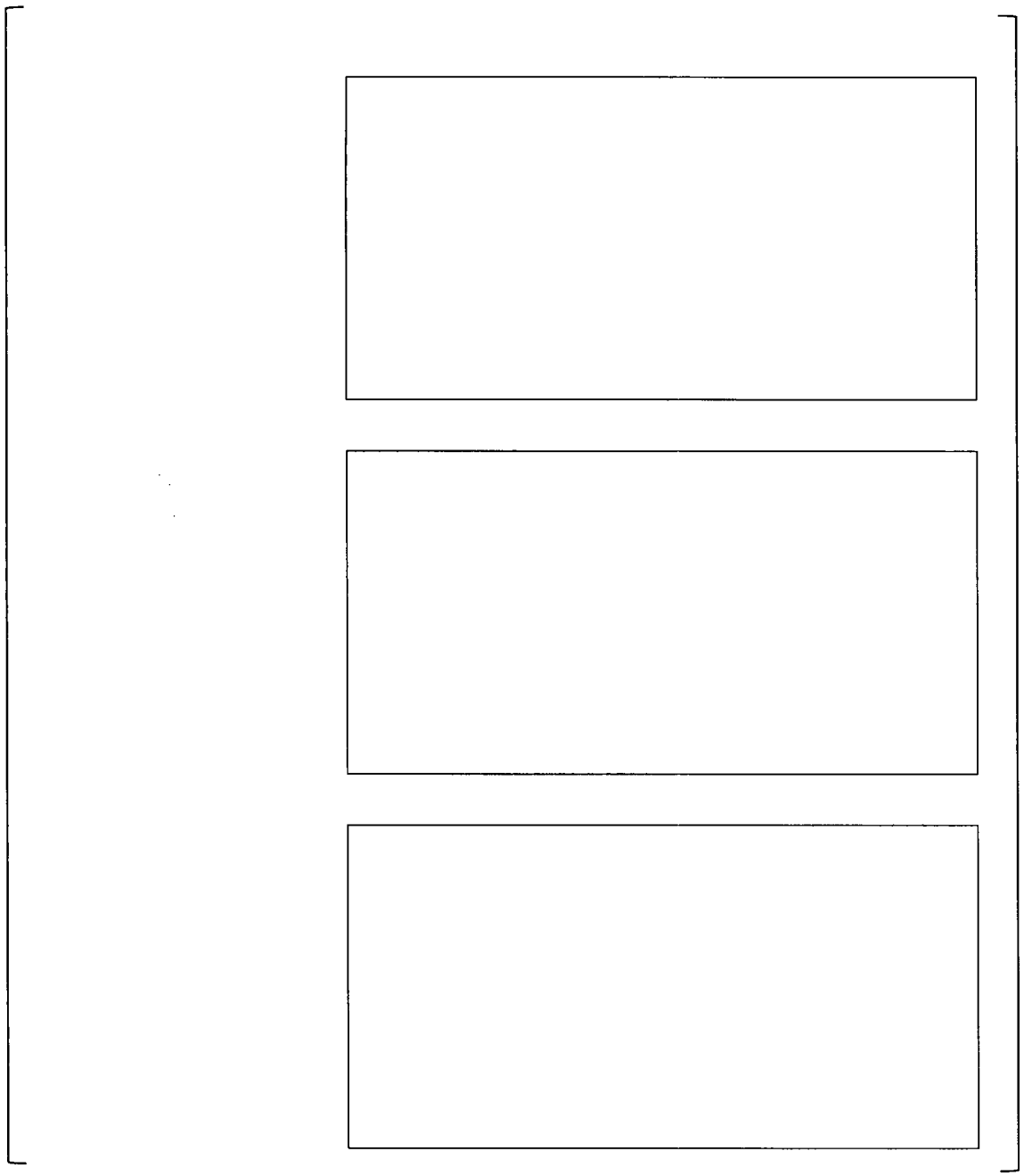


Figure 1 – Retainer Bar Vibration Mode Shapes

Integrity of tubes adjacent to retainer bars

The six tubes with retainer bar wear indications in Unit 2 steam generators have been plugged, regardless of wear depth. To ensure that these tubes remain intact, ½" diameter braided stainless steel cable stabilizers have been installed in these six tubes.

As a preventive measure to ensure that no in-service tubes are subject to retainer bar wear, all tubes adjacent to retainer bars have been plugged.

Additionally, stabilizers have been deployed in six tubes at each retainer bar. Figure 2 shows a typical deployment. Three tubes on each side of the retainer bar have been stabilized: one tube near the center of the retainer bar and two tubes near both ends of the retainer bar. The stabilizers will arrest tube wear at the wear surface of the stabilizers. Since the tubes adjacent to retainer bars have no evidence of significant vibration and the retainer bar vibration amplitude is limited, the stabilizer deployment pattern prevents any possible retainer bar or tube displacement/wear geometry that could sever any of the tubes adjacent to the retainer bars.

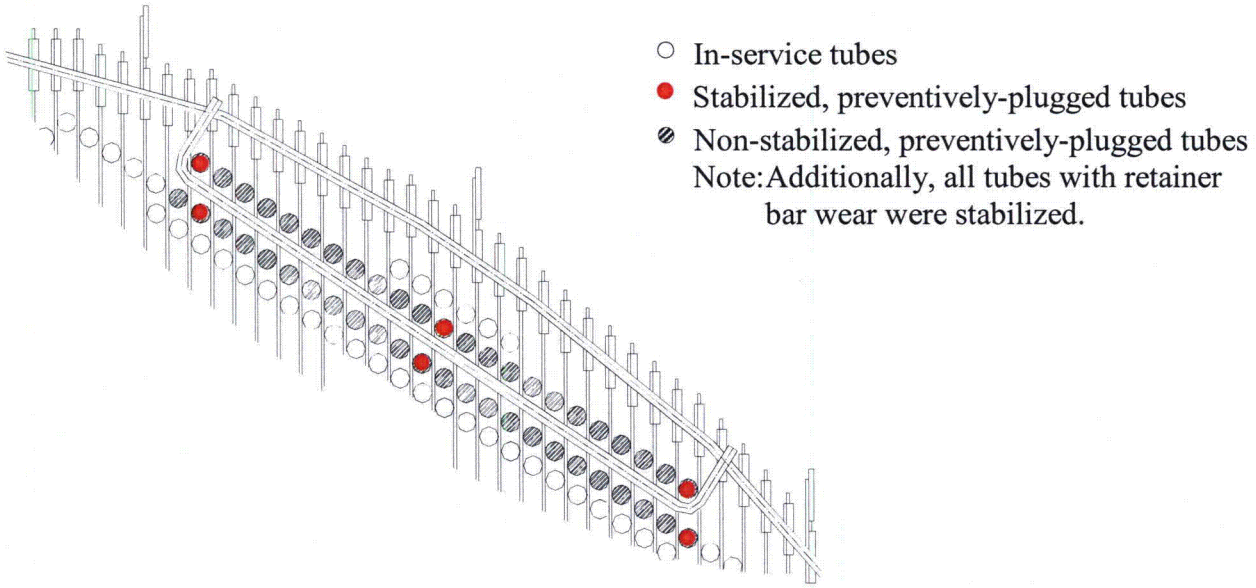


Figure 2 – Typical Stabilizer Deployment to Arrest Retainer Bar Wear

The integrity of the non-stabilized, preventively-plugged tubes is ensured by the limited vibration amplitude of the tubes and retainer bars, along with the number and arrangement of stabilized, preventively-plugged tubes at each retainer bar.

Future inspections of retainer bars

The steam generator retainer bar wear issue has been entered into the SONGS Corrective Action Program (CAP). An effectiveness review requires visual inspection of the smaller diameter retainer bars and welds during the upcoming Unit 2 mid-cycle outage. In addition, all in-service tubes will be inspected by eddy current testing in the upcoming Unit 2 mid-cycle outage. This inspection will confirm that the non-stabilized, preventively-plugged tubes adjacent to the retainer bars are not damaging adjacent in-service tubes.