Morgan, Lewis & Bockius LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004
Tel. 202.739.3000
Fax: 202.739.3001
www.morganlewis.com

Morgan Lewis
COUNSELORS AT LAW

Stephen J. Burdick
202.739.5059
sburdick@morganlewis.com

March 25, 2013

E. Roy Hawkens, Chair
Dr. Anthony J. Baratta
Dr. Gary S. Arnold
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Docket: Southern California Edison Company, San Onofre Nuclear Generating Station, Units 2 and 3, Docket Nos. 50-361-CAL & 50-362-CAL

Re: Sixth Notification of Responses to RAIs

Dear Licensing Board Members:

On March 18, 2013, the staff of the Nuclear Regulatory Commission (NRC) formally issued Requests for Additional Information (RAIs) 33-67 to Southern California Edison Company (SCE) regarding SCE's October 3, 2012 response to the March 27, 2012 Confirmatory Action Letter for San Onofre Nuclear Generating Station Units 2 and 3.

The purpose of this letter is to provide notification to the Licensing Board of SCE's responses to these RAIs to date. The enclosed letters provide SCE's responses to RAIs 33-44, 46-49, 51-52, 54-61, and 63-67. SCE submitted proprietary and non-proprietary versions of the responses to RAIs 33-38, 40-41, 46-49, 51-52, 55-57, 59-60, and 63-67. Only the non-proprietary versions are enclosed. Please let us know if you would like us to send the Licensing Board copies of the proprietary versions pursuant to the Protective Order.

Respectfully submitted,

Signed (electronically) by Stephen J. Burdick
Stephen J. Burdick

Counsel for Southern California Edison Company

Enclosures

1. SCE Response to RAIs 33, 34, 35, 36, and 55 (Mar. 20, 2013) (non-proprietary version)
2. SCE Response to RAIs 37 and 56 (Mar. 20, 2013) (non-proprietary version)
3. SCE Response to RAIs 38, 40, 41, 57, 59, 60, and 63-67 (Mar. 20, 2013) (non-proprietary version)
4. SCE Response to RAIs 39, 43, 44, 58, and 61 (Mar. 20, 2013)
5. SCE Response to RAI 42 (Mar. 15, 2013)
6. SCE Response to RAIs 46-49, 51, and 52 (Mar. 22, 2013) (non-proprietary version)
7. SCE Response to RAI 54 (Mar. 15, 2013)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 50-361-CAL & 50-362-CAL
SOUTHERN CALIFORNIA EDISON COMPANY	)	
	)	
(San Onofre Nuclear Generating Station, Units 2 and 3)	)	March 25, 2013

CERTIFICATE OF SERVICE

I hereby certify that, on this date, a copy of the "Sixth Notification of Responses to RAIs" was filed through the E-Filing system.

Signed (electronically) by Stephen J. Burdick

Stephen J. Burdick
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Phone: 202-739-5059
Fax: 202-739-3001
E-mail: sburdick@morganlewis.com

Counsel for Southern California Edison Company

BOARD NOTIFICATION ENCLOSURE 1

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

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

Proprietary Information
Withhold from Public Disclosure

March 20, 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 (RAIs 33, 34, 35, 36, and 55) 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. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 1, 2013, Request for Additional Information (RAIs 33-37) Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2
4. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 21, 2013, Request for Additional Information (RAIs 53-67) 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.

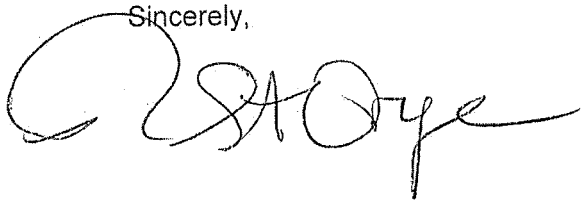
P.O. Box 128
San Clemente, CA 92672

By email dated February 1, 2013 (Reference 3), the NRC issued Requests for Additional Information (RAIs) 33-37 regarding the CAL response. By email dated February 21, 2013 (Reference 4), the NRC issued RAIs 53-67 regarding the CAL response. Enclosure 2 of this letter provides the response to RAIs 33, 34, 35, 36, and 55.

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 AREVA NP Inc., which sets forth the basis on which the information in Enclosure 2 may be withheld from public disclosure 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 AREVA document 51-9197672-002, SONGS Unit 2 Probability of FEI Operational Assessment RAI Responses, 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 33, 34, 35, 36, and 55 (Proprietary)
3. Response to RAI 33, 34, 35, 36, and 55 (Non-Proprietary)

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

ENCLOSURE 1

Notarized Affidavit

AFFIDAVIT

STATE OF NORTH CAROLINA)
) ss.
COUNTY OF MECKLENBURG)

1. My name is Dennis C. Williford. I am Manager, Product Licensing, for AREVA NP Inc. (AREVA NP) and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by AREVA NP to determine whether certain AREVA NP information is proprietary. I am familiar with the policies established by AREVA NP to ensure the proper application of these criteria.

3. I am familiar with the AREVA NP information contained in the document titled "51-9197672-002, 'SONGS Unit 2 Probability of FEI Operational Assessment RAI Responses'," and referred to herein as "Document." Information contained in this Document has been classified by AREVA NP as proprietary in accordance with the policies established by AREVA NP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by AREVA NP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is

requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information":

6. The following criteria are customarily applied by AREVA NP to determine whether information should be classified as proprietary:

(a) The information reveals details of AREVA NP's research and development plans and programs or their results.

(b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.

(c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for AREVA NP.

(d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for AREVA NP in product optimization or marketability.

(e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors to AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

The information in the Document is considered proprietary for the reasons set forth in paragraphs 6(c) and 6(d) above.

7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in this Document has been made available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA NP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

Dennis C. Williford

SUBSCRIBED before me this 14th

day of March 2013.

Thomas A. Casias

Thomas A. Casias
NOTARY PUBLIC, STATE OF NORTH CAROLINA, COUNTY OF MECKLENBURG
MY COMMISSION EXPIRES: 14 December 2014

~~Proprietary Information~~
~~Withhold from Public Disclosure~~

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 RAIs 33, 34, 35, 36, and 55

(NON-PROPRIETARY)

~~Proprietary Information~~
~~Withhold from Public Disclosure~~

RAI 33

Reference 1, Figure 5-5: [

] **[Proprietary]**

RESPONSE

Note: Request for Additional Information (RAI) Reference 1 is "SONGS U2C17 Steam Generator Operational Assessment for Tube-to-Tube Wear," prepared by Areva NP Inc. Document No. 51-9187230-000, Revision 0, October 2012.

[

]

RAI 34

Reference 1, Section 6.4.2, page 60 of 129: [

] **[Proprietary]**

RESPONSE

[

]

RAI 35

Reference 1, Section 7.3, page 98 of 129: The "upper bound contact forces" shown in Figure 7-2 are average values. Clarify whether these "average values" are averages of the upper bound contact forces for each tube in the bundle at each AVB. Why is it acceptable that the calculated upper bound contact force prevents motion for only 97.7 percent of the force spectrum from turbulence? Finally, why has only turbulence excitation been considered in the development of these upper bound contact forces? **[Only Figure 7-2 is proprietary, the question is not.]**

RESPONSE

[

]

RAI 36

Reference 1, Section 7.4, page 98 of 129: [

]

[Proprietary]

RESPONSE

[

]

RAI 55

In Reference 2, page 107 of 129, second to last paragraph, did total gap also include wear of the anti-vibration bars (AVBs) themselves? If not, explain why the approach is conservative. If so, how was wear of the AVBs determined? (This question is a follow-up on RAI No. 26 from the NRC's December 26, 2012, letter).

RESPONSE

Note: RAI Reference 2 is "SONGS U2C17 Steam Generator Operational Assessment for Tube-to-Tube Wear," prepared by Areva NP Inc. Document No. 51-9187230-000, Revision 0, October 2012.

Wear at tube to anti-vibration bar (AVB) intersections was included in the calculations of gaps and contact forces in RAI Reference 1. Both wear of the tube and wear of the AVB were included. Based on wear test data, the wear volume of the AVB is [ ] of the corresponding wear volume of the tube. Increased gaps due to wear were added to the ABAQUS quarter model input in addition to the random selection of gaps from the manufacturing gap distributions.

The sizes of wear induced gaps were based on eddy current inspection data for the worst case steam generators, Unit 2 SG E-089 and Unit 3 SG E-089. The wear gaps were placed at the same locations as found in the eddy current inspection.

The wear level at any given location was adjusted for different time periods using the assumption that the work rate at that location was constant over time. The wear volume loss rate is constant over time at a given location. The wear volume loss rate at different locations is calculated from the eddy current inspection wear depth and the total operating time at End of Cycle 16.

BOARD NOTIFICATION ENCLOSURE 2

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

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

Proprietary Information
Withhold from Public Disclosure

March 20, 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 (RAIs 37 and 56)
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 March 18, 2013, Second 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 March 18, 2013 (Reference 3), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 2 of this letter provides the response to RAIs 37 and 56.

P.O. Box 128
San Clemente, CA 92672

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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 37 and 56 (Proprietary)
3. Response to RAI 37 and 56 (Non-Proprietary)

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

ENCLOSURE 1

Notarized Affidavit

AFFIDAVIT

STATE OF NORTH CAROLINA)
) ss.
COUNTY OF MECKLENBURG)

1. My name is Dennis C. Williford. I am Manager, Product Licensing, for AREVA NP Inc. (AREVA NP) and as such I am authorized to execute this Affidavit.

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4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by AREVA NP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is

requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information":

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(e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors to AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

The information in the Document is considered proprietary for the reasons set forth in paragraphs 6(c) and 6(d) above.

7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in this Document has been made available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA NP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

Dennis C. Williford

SUBSCRIBED before me this 14th day of March 2013.

Thomas A. Casias

Thomas A. Casias
NOTARY PUBLIC, STATE OF NORTH CAROLINA, COUNTY OF MECKLENBURG
MY COMMISSION EXPIRES: 14 December 2014

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 RAIs 37 and 56

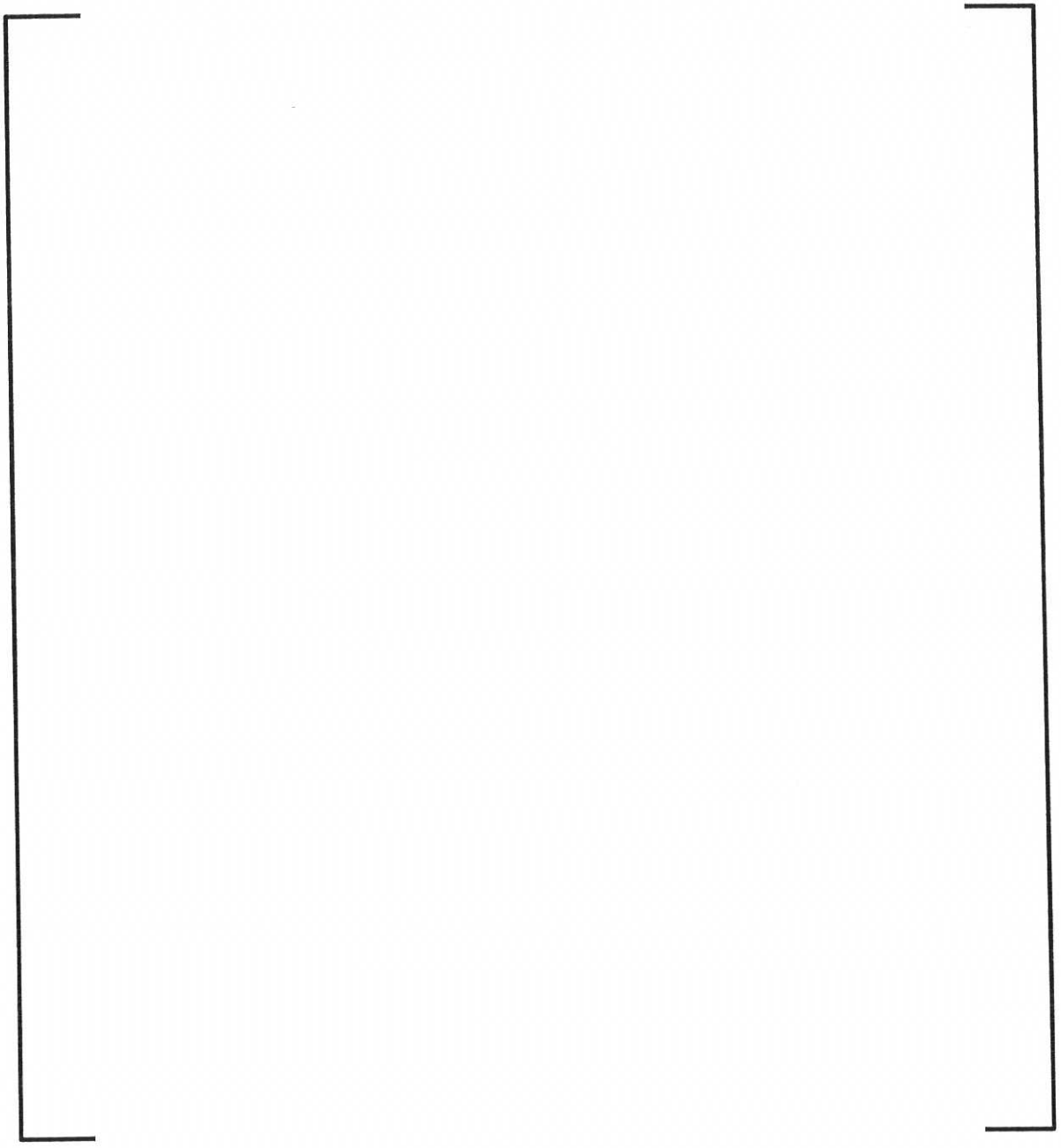
(NON-PROPRIETARY)

RAI 37

Reference 1, Section 8.0, page 107 of 129, and Figure 8-3 indicate that Unit 2 can be operated for 8 months after BOC 17 before exceeding the 5% probability limit. What is the sensitivity of this estimate to a higher assumed value of median contact force for support effectiveness? **[Only Figure 8-3 is proprietary, the question is not.]**

RESPONSE

Note: Request for Additional Information (RAI) Reference 1 is "SONGS U2C17 Steam Generator Operational Assessment for Tube-to-Tube Wear," Areva NP Inc. Document No. 51-9187230-000, Revision 0, October 2012.



Updated Figure 8-3: Probability of FEI vs. Operating Time, 0.95 Probability Stability Ratios, Updated with Unit 3 Results at 5 Months of Operation

Figure 1: Unit 2, Probability of FEI vs Operating Time, SR = 1.0, 99th Percentile Stability Ratios, Various Support Effectiveness Criteria

Figure 2: Unit 3, Probability of FEI vs. Operating Time, SR = 1.0, 99th Percentile Stability Ratios, Various Support Effectiveness

Figure 3: Probability of FEI vs. Operating Time, SR = 1.0 at 100% Power, SR = 0.75 at 70% Power, 95th Percentile Stability Ratios, Various Support Effectiveness Criteria

RAI 56

For Reference 10, Figure 8-3, provide an assessment of the robustness of the Figure 8-3 predictions of the probability of instability versus time in terms of how well it accommodates uncertainty in these predictions for purposes of ensuring acceptable tube integrity margins during the planned 5-month inspection interval for Unit 2. Robustness refers in part to accommodating increases or decreases in the rate at which instability increases with time and the calculated value of the probability of instability at the beginning of cycle (BOC) 16 for Units 2 and 3 and BOC 17 for Unit 2. Robustness also considers the time interval between onset of instability and the loss of acceptable tube integrity margins.

RESPONSE

[

]

Updated Figure 8-3: Probability of FEI vs. Operating Time, 0.95 Probability Stability Ratios,
Updated with Unit 3 Results at 5 Months of Operation

Figure 1: Probability of FEI vs. Operating Time, SR = 1.0 at 100% Power, SR = 0.75 at 70% Power, 95th Percentile Stability Ratios, Various Support Effectiveness Criteria

BOARD NOTIFICATION ENCLOSURE 3

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

Proprietary Information
Withhold from Public Disclosure

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

March 20, 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 (RAIs 38, 40, 41, 57, 59, 60, and 63-67) 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

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3. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 20, 2013, Request for Additional Information (RAIs 38-52) Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

4. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 21, 2013, Request for Additional Information (RAIs 53-67) 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.

P.O. Box 128
San Clemente, CA 92672

By emails dated February 20, 2013 (Reference 3) and February 21, 2013 (Reference 4), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 2 of this letter provides the response to RAIs 38, 40, 41, 57, 59, 60, and 63-67.

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 notarized affidavits from MHI, which sets forth the basis on which the information in Enclosure 2 may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed by paragraph (b)(4) of 10 CFR 2.390. Proprietary information identified in Enclosure 3 was extracted from proprietary MHI documents L5-04GA564, L5-04GA567 and L5-04GA585 which are addressed in the affidavits. 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 RAIs 38, 40, 41, 57, 59, 60, and 63-67 (Proprietary)
3. Response to RAIs 38, 40, 41, 57, 59, 60, and 63-67 (Non-Proprietary)

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

ENCLOSURE 1

Notarized Affidavits

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

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

Sworn to and subscribed

Before me this 2 day

of August, 2012

Masahiko Kubota

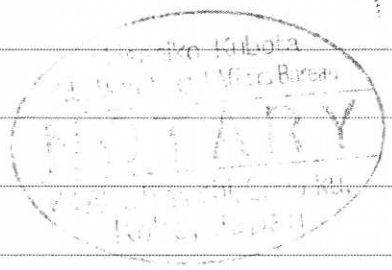
Notary Public

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)

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 documentations to determine whether they contain MHI's 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 reviewed the following documentations and have determined that they contain MHI proprietary information that should be withheld from public disclosure. Those pages containing proprietary information have been bracketed with an open and closed bracket as shown here "[ ]" / and should be withheld from public disclosure pursuant to 10 C.F.R. § 2.390 (a)(4).

   MHI's documents
   - L5-04GA567
     Evaluation of Stability Ratio for Return to Service
   - L5-04GA585
     Analytical Evaluations for Operational Assessment

   SCE's documents
   - 10CFR50.59 Evaluation, Screening
   NECP 800175663
   Steam Generator Replacement Mstr ECP U2
   - 10CFR50.59 Evaluation, Screening
   NECP 800175664
   Steam Generator Replacement Mstr ECP U3

3. The information identified as proprietary in the documents have 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 they describe 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 documents 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 18 day of February, 2013.

Jinichi Miyaguchi

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

Sworn to and subscribed

Before me this 18 day

of February, 2013

31

FEB. 18. 2013

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

Masahiko Kubota

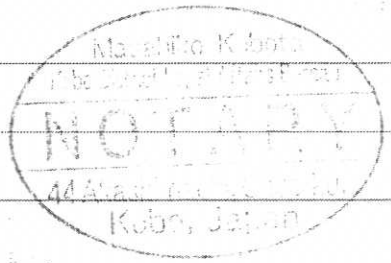
Notary Public

My Commission Expires Does not expire

登簿平成２５年第３１号

認　　証

嘱託人　三菱重工業株式会社　原子力事業本部　原子力製造総括部　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２５年２月１８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

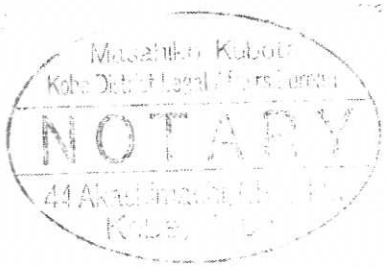
公証人　窪田正彦

公　証　人　役　場

Registered Number 3 1 Date FEB. 18. 2013

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's 38, 40, 41, 57, 59, 60, and 63 through 67

(NON-PROPRIETARY)

RAI 38

In Reference 1, p. 8-3 (308 of 474), Section 3.2), "Loading conditions," please explain how ATHOS output is being converted to hydrodynamic pressure. The NRC staff is not aware that this quantity is a direct output of the ATHOS code. Please show a derivation of this parameter, explain how it is computed for the purposes of data reduction and display, and explain its technical significance.

RESPONSE

Note: Request for Additional Information (RAI) Reference 1 is "Tube Wear of Unit-3 RSG - Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

Conversion of ATHOS Output

Hydrodynamic pressure is not a direct output of ATHOS. The hydrodynamic pressure in the out-of-plane direction on each tube in the ABAQUS model discussed in Section 3.2 of Reference 1 is calculated by the following equation:

$$P_v = \frac{1}{2} \rho v^2$$

Where:

P_v: hydrodynamic pressure in the out-of-plane direction at a given location along the tube

ρ: fluid mixture density (ATHOS output)

v: fluid gap velocity in the out-of-plane direction (ATHOS output)

Computation for Modeling Purposes

The hydrodynamic force (drag force) on a tube is calculated from hydrodynamic pressure as follows:

$$F = P_v \times C_d \times D$$

Where:

F: hydrodynamic force per unit tube length at a given location along the tube

P_v: hydrodynamic pressure at a given location along the tube

C_d: drag coefficient

D: tube diameter

Hydrodynamic force is applied to each tube element in the contact force finite-element model as a distributed load. The ATHOS results are mapped to the corresponding elements in the bundle analysis.

Explanation of Significance

The minor effect of hydrodynamic forces on tube bundle deformation is displayed in the Appendix 8 figures of RAI Reference 1. The technical significance of the hydrodynamic pressure is discussed in the response to RAI 27.

RAI 40

In Reference 2, p. 40, it is stated that "...plugged tubes are assumed to be in wet condition despite the void fraction." Please explain why this assumption is used, and provide information to justify that it is appropriate (i.e., valid, conservative, or insignificant) for the purposes of the relevant analyses.

RESPONSE

Note: RAI Reference 2 is "Evaluation of Stability Ratio for Return to Service," MHI Document No. L5-04GA567, Revision 6.

Use of wetted condition assumption for plugged tubes

The assumption of wet condition for plugged tubes is used to apply the appropriate correlations of structural and squeeze film damping. Section 7.1.1.1 of RAI Reference 2 presents different correlations for structural damping depending on whether the tube is in liquid or in gas. Stability ratio calculations performed for plugged tubes use the liquid correlation to evaluate structural damping ratio.

The squeeze film damping ratio correlation is dependent on the number of anti-vibration bar (AVB) support points. For in-service tubes this correlation was modified to only account for the number of wetted AVB support points. For plugged tubes, this modification is not necessary and the original correlation that accounts for all AVB support points was used.

Explain why this assumption is used

In two-phase flow at high void fraction, liquid droplets are entrained in the vapor flow. The droplets impinge on the tubes and structures in the bundle. Liquid film flow occurs on the tubes and structures because the transported droplets and mist spread due to the shear stress on the liquid surface from the two-phase flow. Plugged tubes have no heat flux and their outside surface remains wetted.

Provide information to justify that the assumption is appropriate

Further investigation of the open literature supports the assumption. Experimental measurements of local liquid film thickness obtained from Reference R1 (citation below), indicate that the film maintains a minimum finite thickness value under a range of flow and heat flux conditions in annular two-phase vertical flow. Film flow rate and thickness measurements up to 90% exit steam quality were also reported in Reference R2 (citation below), and those tests demonstrate the existence of a thin liquid film in this high-quality vertical steam/water flow.

At 70% power, the ATHOS model for the SONGS replacement steam generator shows that the maximum void fraction in the tube bundle is [ ], and maximum steam quality is [ ]. At this void fraction, there is a continuous liquid film on all surfaces as described in Attachment 2 of RAI Reference 2 (pg.111). All tube-to-AVB intersections of both plugged and in-service tubes are subject to wet conditions at 70% power.

References

R1 Okawa T., Goto T. and Yamagoe Y., "Liquid film behavior in annular two-phase flow under flow oscillation conditions," International Journal of Heat and Mass Transfer 53 (2010) 962-971.

R2 Würtz J., "An experimental and theoretical investigation of annular steam-water flow in tubes and annuli at 30 to 90 bar," Technical Report No. 372, Riso National Laboratory (1978).

RAI 41

Reference 2, p. 61 and 63, Tables 8.1.1-1 and 8.1.2-1. The data in Table 8.1.1-1 are based on an assumption that all supports are active, whereas the data in Table 8.1.2-1 are based on an assumption that 1 support is inactive. The NRC staff observed that [
]. Please explain the significant causes of the difference in two-phase damping between these two cases. **[Proprietary]**

RESPONSE

Note: RAI Reference 2 is "Evaluation of Stability Ratio for Return to Service," MHI Document No. L5-04GA567, Revision 6.

The two cases have different two-phase damping ratios because two-phase damping is a function of effective homogeneous void fraction. The effective homogeneous void fraction is the mode-shape-weighted average of the homogeneous void fraction distribution. The two-phase damping is different for the same thermal-hydraulic conditions because the two cases have different vibration mode shapes.

The two-phase damping ratio is correlated by the following equations (Equations 11 to 15 (P.36) of RAI Reference 2).

$$\xi_{TP} = 4\left(\frac{\rho_l D_o^{\ 2}}{m_0}\right) f(\overline{\beta}) \left\{\frac{1+(D_o/D_e)^3}{\left[1-(D_o/D_e)^2\right]^2}\right\}$$

$$f(\overline{\beta}) = \begin{cases} \overline{\beta}/40 & for \quad \overline{\beta} < 40\% \\ 1 & for \quad 40\% \le \overline{\beta} \le 70\% \\ 1-(\overline{\beta}-70)/30 & for \quad \overline{\beta} > 70\% \end{cases}$$

$$D_e = \left(1+\frac{1}{2}P/D_o\right)P$$

$$m_0 = m_v + m_p + m_t$$

$$m_v = \frac{\pi D_o^2 \rho_o}{4}\left\{\frac{(D_e/D_o)^2+1}{(D_e/D_o)^2-1}\right\}$$

Where,

ξ_{TP} : Two-phase damping ratio
$\overline{\beta}$: Effective Homogeneous void fraction
D_0 : Tube outside diameter
D_e : Tube equivalent outside diameter
P : Tube pitch
ρ_o : Density of secondary mixture flow (Calculated by ATHOS)
ρ_l : Density of secondary liquid flow
m_0 : Average tube mass per unit length
m_v : Virtual added mass per unit length

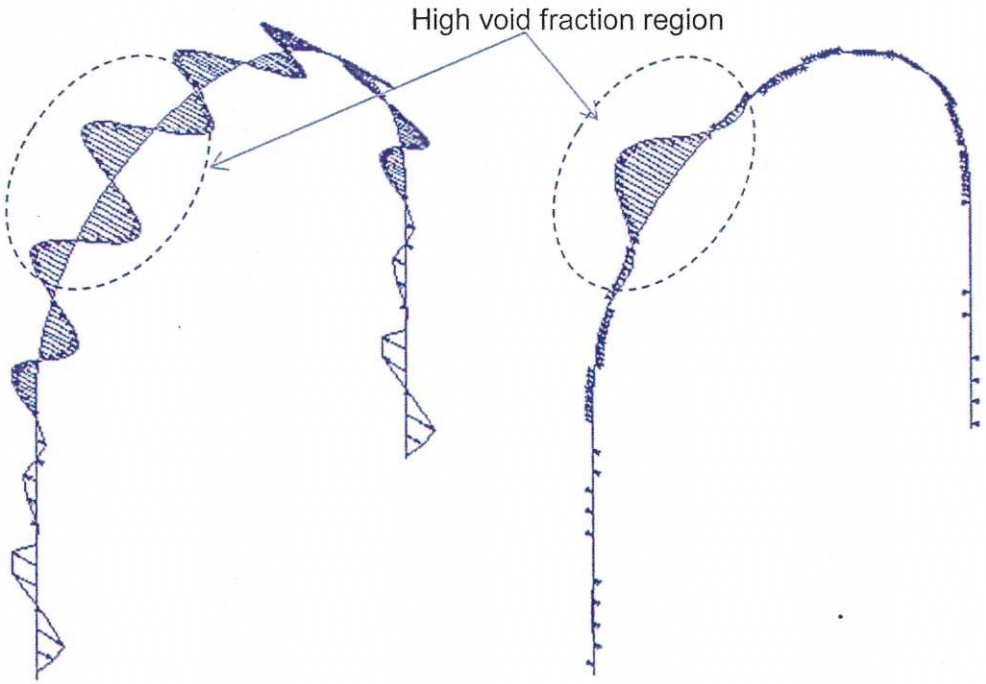
m_p : Mass of primary coolant in tube per unit length
m_t : Mass of tube metal per unit length

The effective homogeneous void fraction is the mode-shape-weighted average calculated from the following equation, integrated over the length of the tube (Equation 10 (P.36) of RAI Reference 2):

$$\overline{\beta} = \frac{\int \beta(x)\phi^2 dx}{\int \phi^2 dx}$$

Where,
β : Homogeneous void fraction
Φ : Vibration mode
x : Tube axis

The following figures show mode shapes for two support conditions:



(a) All supports are active (b) One support is inactive

The highest calculated stability ratio is obtained when the inactive support location coincides with the region of highest void fraction. This region has the strongest mode-shape weighting for the effective homogeneous void fraction calculation with one inactive support. The effective homogeneous void fractions ($\overline{\beta}$) for each tube and support case are shown in the table below. Using the equations shown above, the difference in effective homogeneous void fraction results in approximately a three times greater two-phase damping ratio for the case with all active supports than the case with one inactive support.

Tube		All Supports Active (RAI Ref 2 Table 8.1.1-1)			One Support Inactive (RAI Ref 2 Table 8.1.2-1)		
Row	Col	$\overline{\beta}$, %	$f(\overline{\beta})$	ξ_{TP}	$\overline{\beta}$, %	$f(\overline{\beta})$	ξ_{TP}
80	70	[redacted]					
80	80						
100	70						
100(*)	80(*)						
120	70						
120	80						
95(*)	85(*)						
125	85						
138	84						

Note (*): Plugged tube with Type J stabilizer

RAI 57

In Reference 3, Appendix 9, Table 6.2-1, why is tube support plate (TSP) hole mis-location not included in the table headings? If not accounted for in the analysis, explain why the approach is conservative. If used in the analysis, provide an updated table that includes the TSP hole mis-location parameter.

RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

The TSP hole mis-location (pitch variation) was inadvertently omitted from Table 6.2-1, but was accounted for in the contact force analysis. Table 6.2-1 was updated by adding the TSP Hole Position, and is provided as requested.

Updated Table 6.2-1 Measurement results of the dimensions Unit: mm (mils)

Unit	AVB thickness change from nominal δ_A		Tube ovality δ_H	Standard deviation σ						
				AVB thickness change from nominal σ_A		Tube ovality σ_H	AVB twist[*2] σ_{TA}	AVB Flatness[*3] σ_{BA}	Tube Flatness σ_B	TSP Hole position σ_S
	Bending portion[*1]	Straight Bar		Bending portion	Straight Bar					
Case 1 Unit-2A (U2-E089)	[ ] [ ] [ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ] [ ] [ ]	[ ]	[ ] [ ]	[ ] [ ]
Case 2 Unit-3A (U3-E089)	[ ] [ ] [ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ]	[ ] [ ] [ ] [ ]	[ ]	[ ] [ ]	[ ] [ ]
Note	Measured[*1]	Measured	Measured	Measured	Measured	Measured	Go/No-go checked	Go/No-go checked	Go/No-go checked	Sampled

Note) *1:AVB thickness of bending portion is assumed based on the fact obtained by the AVB pressing test results (See Attachment 9-1 for details), which indicated that AVB nose thicknesses of Unit-2 SGs are larger than Unit-3 SGs due to the difference of AVB pressing load ([ ] for Unit-2 SGs and [ ] for Unit-3 SGs) and the side wide AVBs of Unit-2 are thinner than other types of AVBs.

*2:AVB twist probability distributions are assumed based on the AVB pressing test results (See Attachment 9-1 for details). The probability distribution multiplied by the factor of each AVB type, shown in this table, is assumed.

*3: AVB Flatness is judged as 0, because AVB flatness is assumed macro distortion.

RAI 59
In Reference 3, Appendix 9, Attachment 9-1; define the statistical distributions which were actually sampled for Unit 2 and Unit 3. What is the technical justification for the assumed distributions compared to the actual distribution of the data?

RAI 67
Reference 3, Appendix 9, Attachment 9-3; describe in detail any "tuning" of the contact force model that was performed to replicate the ding signals observed during pre-service inspection.

RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

Three probability distribution functions (PDF) for Side Narrow and Center Narrow AVBs for Unit 2 and Center Narrow for Unit 3 were created from actual distributions of data. (See Figure 1 for Side Narrow and Center Narrow AVBs locations). These three measured PDFs were multiplied by amplification ("tuning") factors in order to produce eight input PDFs, one for each AVB type in each unit. The amplification factors were adjusted to replicate the ding signals in the pre-service inspections. Figures 2 and 3 show the measured PDFs, amplification factors and the resulting PDFs used as inputs to the contact force models. The resulting input PDFs were the statistical distributions which were actually sampled for Unit 2 and Unit 3.

The following explanation provides details for the input PDFs of each AVB type (Center Narrow, Center Wide, Side Narrow and Side Wide). Unit 2 Center Wide AVB and Side Wide AVB input PDFs were generated from Center Narrow [ ] ton press measured PDF. The bending angles of the Center Wide and Side Wide AVBs are closer to the Center Narrow AVB bending angle than that of the Side Narrow AVB. For Unit 3, the Center Narrow [ ] ton press measured PDF was used to generate all Unit 3 input PDFs. Using the Center Narrow AVB only for Unit 3 is reasonable because [ ] ton press reduces AVB twist scatter such that the twist distribution due to AVB bending angle is negligible.

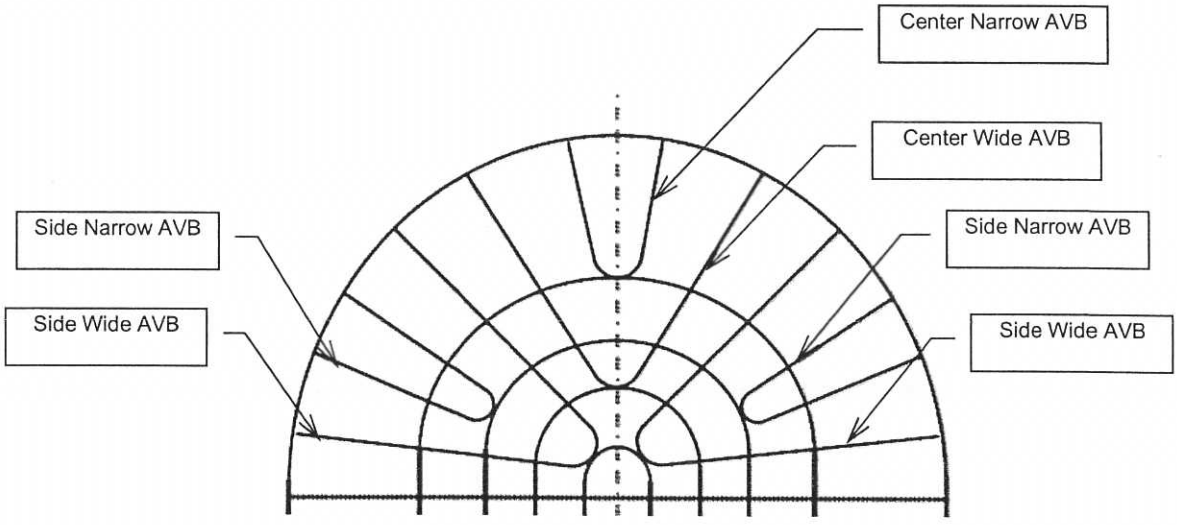


Figure 1 - AVB Configuration

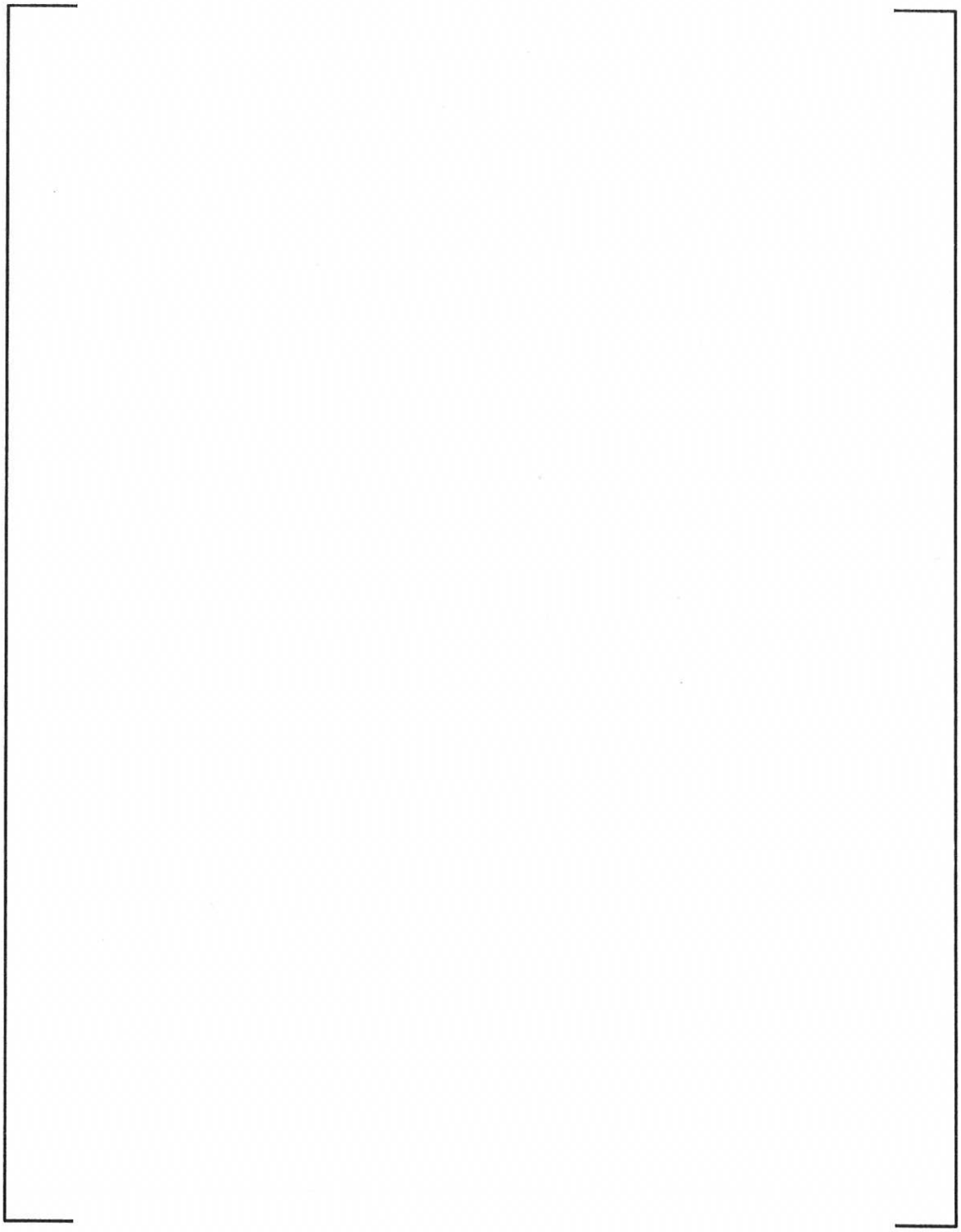


Figure 2 - Measured test data and input PDFs for Unit 2

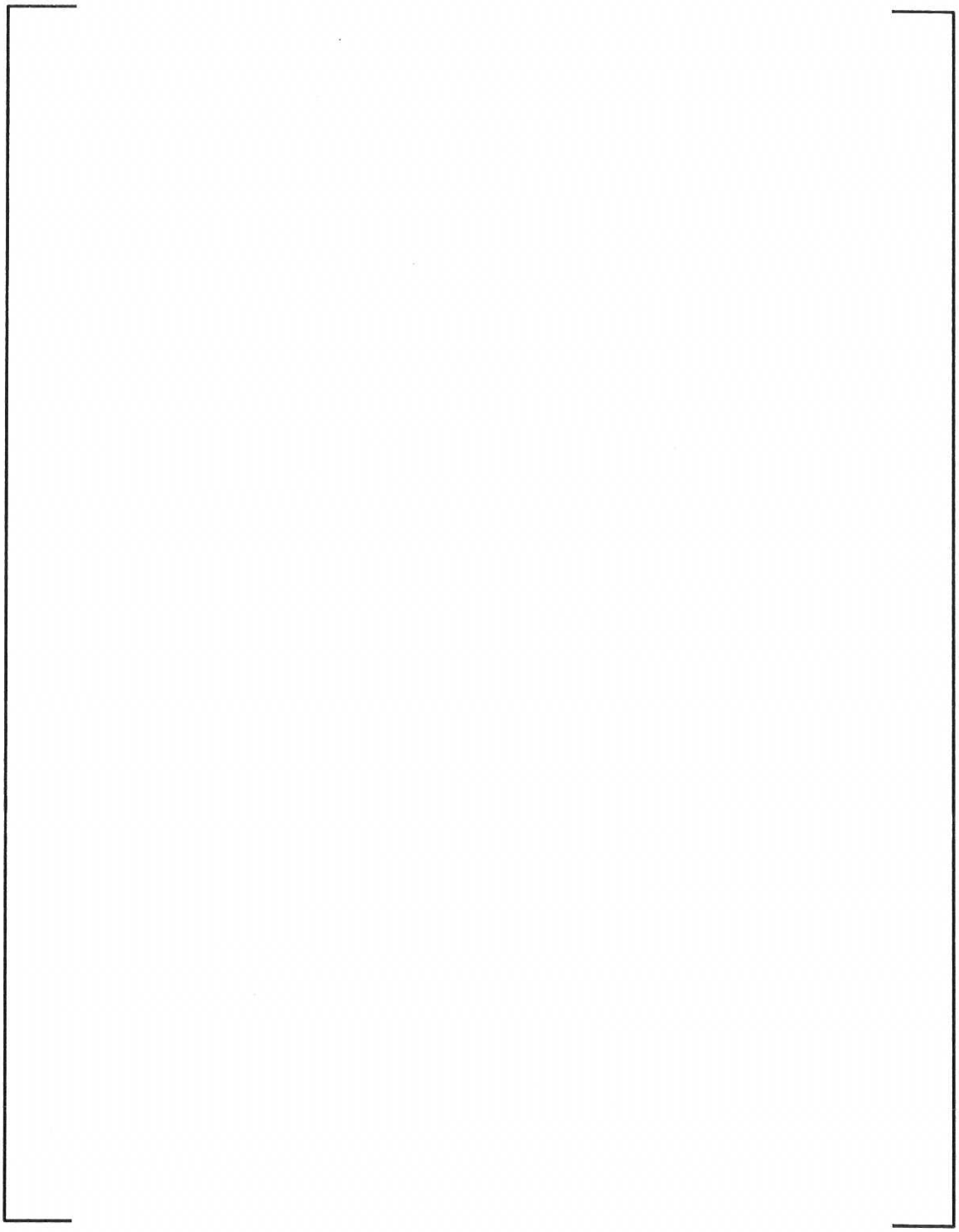


Figure 3 - Measured test data and input PDFs for Unit 3

RAI 60

In Reference 3, Appendix 9, Figures 7.2-3 and 7.2-5 apply to Unit 3. Please provide similar figures for Unit 2.

RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

Figures 7.2-3 and 7.2-5 were updated to include Unit 2 data and to correct Unit 3 data. The revised figures are provided below.

Unit-2

Unit-3

Figure 7.2-3 Displacements at each AVB contact point of Row100 tubes in Case 1 & 2

Figure 7.2-5 Inverse of average gap at each AVB point Row100 tubes in Case 1 and 2

RAI 63

In Reference 3, Page 66, the last sentence on this page states, "Therefore, the difference of the contact forces between Unit-2 and Unit-3 is caused by the difference of the manufacturing dimensional tolerances other than the outer-most tube-to-AVB gaps." Explain the basis for this conclusion in light of the omission of the measured tube-to-AVB gaps at the outer tubes as a boundary condition in the contact force model described in Appendix 9 of Reference 3.

RESPONSE

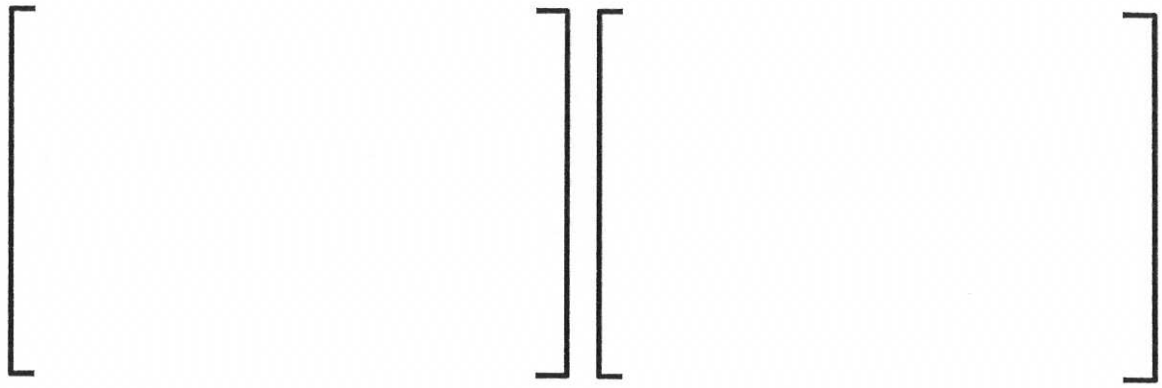
Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

It is important to note that the outermost tube rows did not exhibit instability in either the tube stability analysis or in the actual steam generators.

The following figure shows the distribution of the as-measured outermost tube-to-AVB radial gaps.

It is noted that the outer-most gaps were measured by a feeler gauge. The vast majority of gaps were measured at less than [ ] mils and there was no significant difference between the measurements in Unit 2 and Unit 3.

The randomly selected input gaps for the entire tube bundle in the contact force model (including outermost tubes) varied from [ ] to [ ] mils as shown in the following two figures. The mean value was approximately [ ] mils and standard deviation was [ ] mils.



Distribution of input radial gaps

As these figures show, the input gaps to the contact force model bound the as-measured outermost tube-to-AVB gaps.

The outermost tube rows did not exhibit instability in either the probability of fluid elastic instability calculation or in the actual steam generator.

Because an AVB does not have sufficient stiffness, the contact forces for the interior rows are not affected by the variation of the outermost tube-to-AVB gap. Calculations were performed by rerunning the contact force models for both units with redistributed tube-to-AVB gaps at the outermost rows. As shown in the following figures, the average contact forces near the outermost row slightly changed, but the contact forces in the inside rows did not.

Original (from Figure 7.2-1)

Redistributed

Distributions of the average contact forces of each row in Unit 2

Original (from Figure 7.2-2)

Redistributed

Distributions of the average contact forces of each row in Unit 3

RAI 64

In Reference 3, Appendix 9, page 9-6 (355 of 474), it is stated, "Especially for AVB twist, AVB twist factor in consideration of torsion stiffness is defined as a decrease function of distance from AVB bending peak, because the more contact points leave from AVB nose, the less AVB torsion stiffness is." Please clarify the meaning of this sentence by answering the following questions: What is the "AVB twist factor?" What is meant by "AVB twist factor in consideration of torsion stiffness?" What parameter is decreasing as a function of distance from the AVB nose, AVB twist or AVB torsional stiffness? Why does torsional stiffness vary as function of distance from the AVB nose? Describe the specific variation of torsional stiffness with distance from nose function that was used in the analysis. How was this variation determined?

RAI 65

In Reference 3, Appendix 9, Figure 6.2.2 shows AVB twist factor as a function of distance from AVB nose tip. Is this the function that was used in the contact force analysis? For all AVBs? If not, what twist factor functions were used for the other AVBs? How were these twist factor functions determined? Explain the relationship between twist factors shown in this figure versus those shown in Table 6.2-1.

RAI 66

In Reference 3, Appendix 9, page 9-6 (355 of 474) it is also stated, "In AVB nose area, the factor is always 1, because increased twist from nose tip and decreased stiffness from nose tip cancel each other." Please provide a detailed clarification of this sentence. The staff further notes that "twist" and "stiffness" have different units. How can they cancel each other out?

RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report," MHI Document No. L5-04GA564, Revision 9.

RAIs 64 - 66 are related to AVB twist factors.

What is the "AVB twist factor?"

AVB twist factor is defined as:

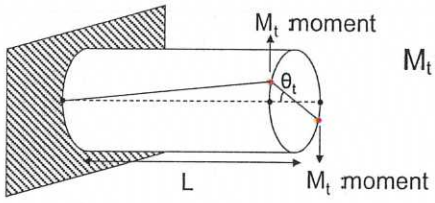
$$\left(\frac{k_1}{k_1+k_2}\right)$$

Where:

k_1 is the AVB out of plane spring stiffness due to twist
k_2 is the radial tube compression stiffness.

What is meant by "AVB twist factor in consideration of torsion stiffness?

AVB spring stiffness k_1 is derived from beam torsion theory. In the case where a moment acts upon a beam, the relation of moment, M_t, and torsion angle, θ_t, is expressed as follows:



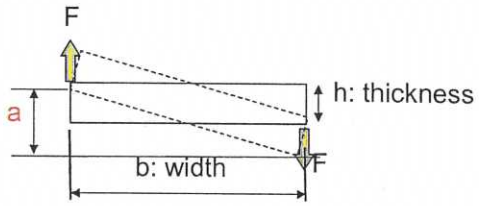
$$M_t = G \times I_P \times \theta_t / L$$

Where:

G: shear modulus of elasticity
I_P: polar moment of inertia of area

Considering that this beam represents an AVB, the relation of contact force, F, and AVB displacement due to twist, a, is expressed as follows:

$$F = \frac{M_t}{\sqrt{\left(\frac{b}{2}\right)^2 + \left(\frac{h}{2}\right)^2}} = \frac{GI_P}{\sqrt{\left(\frac{b}{2}\right)^2 + \left(\frac{h}{2}\right)^2} \cdot L} \cdot \theta_t$$



AVB cross section

$$\cong \frac{GI_P}{\sqrt{\left(\frac{b}{2}\right)^2 + \left(\frac{h}{2}\right)^2} \cdot L} \cdot \frac{a}{b} \quad \text{(because a << b)}$$

$$= \frac{GI_P}{\sqrt{\left(\frac{b}{2}\right)^2 + \left(\frac{h}{2}\right)^2} \cdot b} \cdot \frac{a}{L} = k_1 a$$

k_1 =quantity inside red box and,

$F = k_1 a$

What parameter is decreasing as a function of distance from the AVB nose, AVB twist or AVB torsional stiffness? Why does torsional stiffness vary as function of distance from the AVB nose?

AVB spring stiffness due to twist, k_1, decreases as a function of distance because it is inversely proportional to distance, L, from AVB nose tip. AVB twist factor is also a function of distance from the AVB nose tip.

Describe the specific variation of torsional stiffness with distance from nose function that was used in the analysis. How was this variation determined?

The response to the previous question explained the variation of torsional stiffness with distance from the AVB nose tip. AVB twist factor, which is related to torsional stiffness, was the input parameter used in the contact force analysis. AVB twist factor decreases as a function of distance from the AVB nose tip. Since the AVB is fixed at the retaining bar, the AVB twist factor is also a function of distance from the retaining bar. The variation was determined analytically and the resulting relationship is plotted in Figure 6.2-2 from RAI Reference 3, Appendix 9.

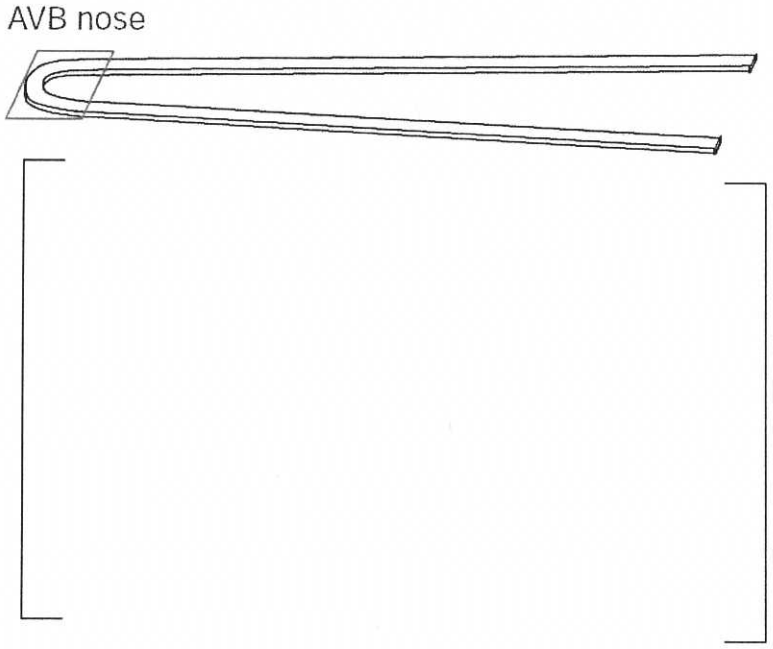
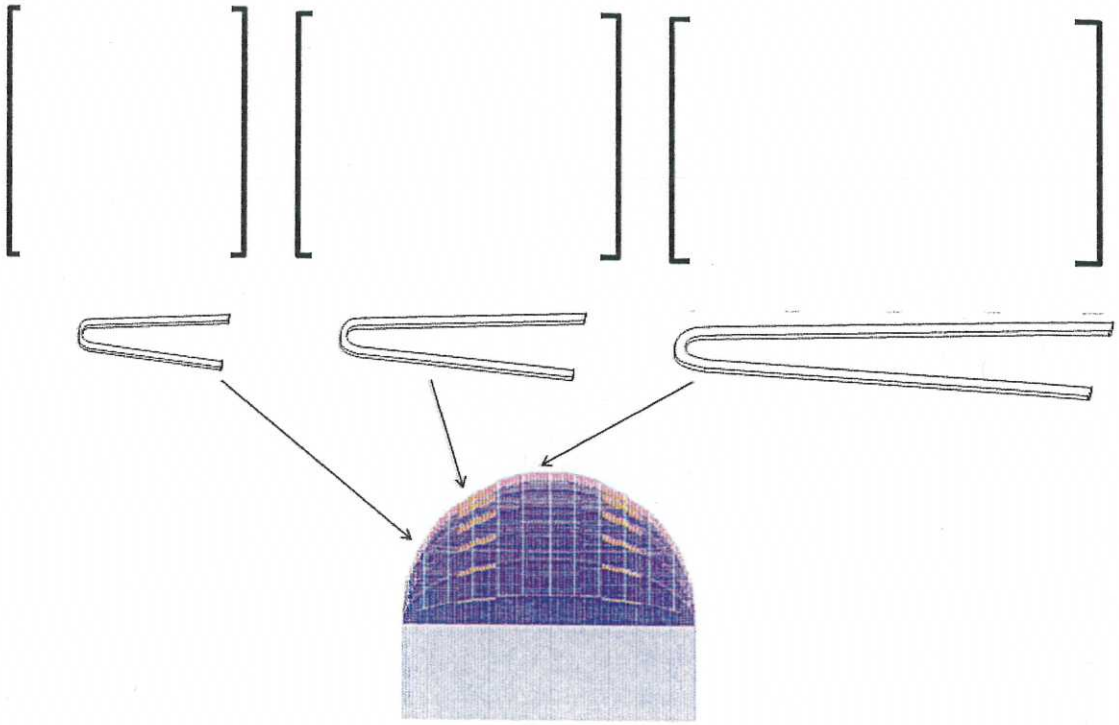


Figure 6.2-2 from RAI Reference 3, Appendix 9

Is this the function that was used in the contact force analysis? For all AVBs? If not, what twist factor functions were used for the other AVBs? How were these twist factor functions determined?

Yes, this function was used in the contact force analysis. The function was used for all AVBs. The AVB twist factor depends on AVB length. Three typical AVB twist factors are shown in the following figure. As described above, the twist factor functions were determined analytically, using strength of materials formulas.



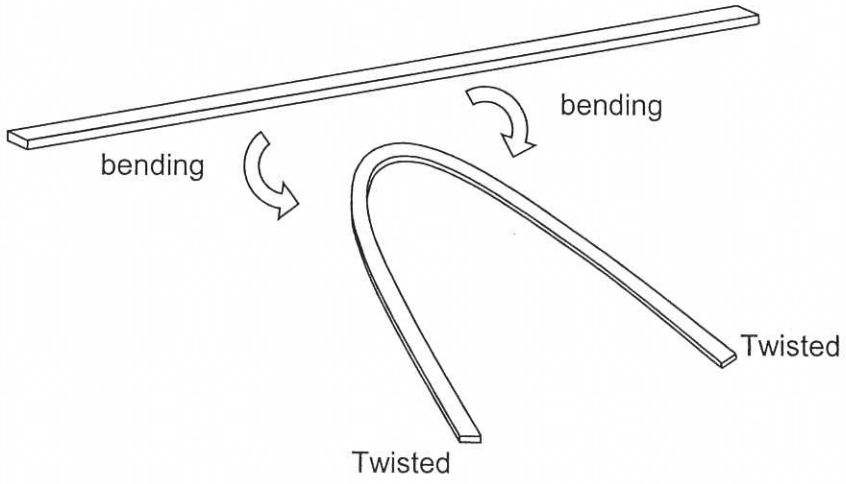
Typical AVB twist factors

Explain the relationship between twist factors shown in this figure [6.2-2] versus those shown in Table 6.2-1.

Figure 6.2-2 shows the typical distribution of AVB twist factor along AVB length. Table 6.2-1 shows AVB twist amplification constants used for "tuning" the contact force model to replicate the ding signals observed during pre-service inspection. AVB twist amplification constants are further discussed in the response to RAIs 59 and 67.

"In AVB nose area, the factor is always 1, because increased twist from nose tip and decreased stiffness from nose tip cancel each other." Please provide a detailed clarification of this sentence. The staff further notes that "twist" and "stiffness" have different units. How can they cancel each other out?

AVB twist is generated by bending an AVB straight bar during manufacturing as shown in the following figure.



AVB Bending Process (Twist Generation)

AVB twist at the AVB nose tip (centerline of AVB) is taken as a reference point and the AVB twist factor is considered to be 1.0 at the nose tip. The bending process increases the AVB twist to a maximum at the start of the straight section. AVB torsional stiffness, which is inversely proportional to AVB length, decreases from the AVB nose tip to the start of the straight section. Contact force increases due to AVB twist but decreases due to AVB torsional stiffness. The increase and decrease approximately cancel through the nose section. To reflect this, the contact force model used a constant AVB twist factor of 1.0 in the AVB nose section.

BOARD NOTIFICATION ENCLOSURE 4

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

March 20, 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 (RAIs 39, 43, 44, 58 and 61) 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. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 20, 2013, Request for Additional Information (RAIs 38-52) Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

4. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 21, 2013, Request for Additional Information (RAIs 53-67) 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 emails dated February 20, 2013 (Reference 3) and February 21, 2013 (Reference 4), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 1 of this letter provides the response to RAIs 39, 43, 44, 58 and 61.

P.O. Box 128
San Clemente, CA 92672

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,

Enclosure:

1. Response to RAIs 39, 43, 44, 58 and 61

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

ENCLOSURE 1

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 RAIs 39, 43, 44, 58 and 61

RAI 39

In Reference 2, p. 36, Bottom of page, the term β is not defined. Please define the parameter, and explain (1) how it is formulated, and (2) how it is related to the ATHOS computed nodal void fraction.

RESPONSE

Note: RAI Reference 2 is "Evaluation of Stability Ratio for Return to Service," prepared by MHI, Document No. L5-04GA567, Revision 6.

Define the parameter β

As used in RAI Reference 2, β is the homogeneous void fraction defined by the volumetric flow rates of the gas and liquid phases:

$$\beta \equiv \frac{\dot{V}_g}{\dot{V}_g + \dot{V}_l}$$

The correlations used in the stability ratio evaluation depend, in part, on the homogeneous void fraction. Experiments control void fraction by varying the volumetric flow rate of the two phases, so experimental data are correlated to homogeneous void fraction. Homogeneous void fraction distribution along the tube length is not an ATHOS output. The homogeneous void fraction is calculated by using the Smith correlation and nodal void fraction obtained from ATHOS output as outlined below.

1) Explain how β is formulated

The homogeneous void fraction, β, is formulated in terms of quality (*x*, vapor mass flow fraction). The definition for quality is:

$$x \equiv \frac{\dot{m}_g}{\dot{m}_g + \dot{m}_l}$$

The mass flow rate of each phase is defined as;

$$\dot{m}_g \equiv \rho_g \cdot \dot{V}_g$$

$$\dot{m}_l \equiv \rho_l \cdot \dot{V}_l$$

Substitute the definition for each mass phase into the expression for quality:

$$x = \frac{\rho_g \cdot \dot{V}_g}{\rho_g \cdot \dot{V}_g + \rho_l \cdot \dot{V}_l}$$

The liquid volume flow fraction (1 – β) is derived from the homogeneous void fraction:

$$1 - \beta = 1 - \frac{\dot{V}_g}{\dot{V}_g + \dot{V}_l} = \frac{\dot{V}_l}{\dot{V}_g + \dot{V}_l}$$

Substitute in the quality expression:

$$x = \frac{\rho_g \cdot \dot{V}_g}{\rho_g \cdot \dot{V}_g + \rho_l \cdot \dot{V}_l} \cdot \frac{\frac{1}{\dot{V}_g + \dot{V}_l}}{\frac{1}{\dot{V}_g + \dot{V}_l}} = \frac{\rho_g \cdot \frac{\dot{V}_g}{\dot{V}_g + \dot{V}_l}}{\rho_g \cdot \frac{\dot{V}_g}{\dot{V}_g + \dot{V}_l} + \rho_l \cdot \frac{\dot{V}_l}{\dot{V}_g + \dot{V}_l}} = \frac{\rho_g \cdot \beta}{\rho_g \cdot \beta + \rho_l \cdot (1 - \beta)}$$

Solve for β as a function of quality, x:

$$\rho_g \cdot \beta = \rho_g \cdot \beta \cdot x + \rho_l \cdot x - \rho_l \cdot \beta \cdot x$$

$$\rho_l \cdot \beta \cdot x + \rho_g \cdot \beta - \rho_g \cdot \beta \cdot x = \rho_l \cdot x$$

$$\beta = \frac{\rho_l \cdot x}{\rho_l \cdot x + \rho_g \cdot (1 - x)}$$

2) Explain how β is related to the ATHOS computed nodal void fraction α

Homogenous void fraction (β) is obtained from local void fraction (α) through the use of the Smith correlation and saturated density for liquid and vapor.

- ATHOS provides nodal void fraction (α) as a function of position along the tube.
- Nodal void fraction (α) is converted to quality (x) by using the Smith correlation:

$$\frac{1}{\alpha} = 1 + \frac{\rho_g}{\rho_l} \cdot e \cdot \left(\frac{1}{x} - 1\right) + \frac{\rho_g}{\rho_l} \cdot (1 - e) \cdot \left(\frac{1}{x} - 1\right) \cdot \left[\frac{\frac{\rho_l}{\rho_g} + e \cdot \left(\frac{1}{x} - 1\right)}{1 + e \cdot \left(\frac{1}{x} - 1\right)}\right]^{1/2}$$

- Quality is used to calculate homogeneous void fraction (β):

$$\beta = \frac{\rho_l \cdot x}{\rho_l \cdot x + \rho_g \cdot (1 - x)}$$

Terminology

α: Nodal Void Fraction
ρ_g: Vapor Density
β: Homogeneous Void Fraction (vapor volume fraction)
ρ_l: Liquid Density
m_g: Vapor Mass
m_l: Liquid Mass
V_g: Vapor Volume
V_l: Liquid Volume
x : Mixture Quality (vapor mass fraction)
e: Entrainment Coefficient (ratio of the mass of liquid flowing in the homogeneous mixture to the total mass of water flowing)

RAI 43

In Reference 4, p. 15, Section 6.3, "Assumption," Item (1) "Fluid force," please explain the basis for the statement, "The turbulent excitation force is evaluated and fluid force caused by FEI is not taken into account..." It is not clear how the turbulent excitation force is used to determine when the friction force is adequate to assume that there is no in-plane motion at the subject AVB intersection. Please clarify the statement, "When the friction force due to contact force is smaller than the turbulent excitation force at an AVB support point, a tube can slide in the in-plane direction."

RESPONSE

Note: RAI Reference 4 is "Analytical Evaluations for Operational Assessment," prepared by MHI, Document No. L5-04GA585, Revision 2.

It is important to note that the analysis in RAI Reference 4, Section 6, was ultimately not used in the Operational Assessment (OA) contained in Return to Service Report Attachment 6, Appendix B. As explained in the response to RAI 35, an alternate analysis was developed and validated based on the observed performance of Unit 3 and Unit 2.

Explain the basis for the statement "The turbulent excitation force is evaluated and fluid force caused by FEI is not taken into account ..."

The condition being evaluated is the design condition with no relative motion between the tube and the AVB. In the design condition FEI is not occurring so the only driving force is from turbulence.

Please clarify the statement, "When the friction force due to contact force is smaller than the turbulent excitation force at an AVB support point, a tube can slide in the in-plane direction."

The support effectiveness criterion developed in RAI Reference 4, Section 6, assumed only one AVB support resists all the flow force along the U-bend tube. As long as the static resisting friction force at an AVB intersection is greater than the driving force due to flow, the tube will not move in the in-plane direction at the AVB intersection. For this support effectiveness criterion, the AVB intersection was considered to be an active support. As indicated above and as discussed in the response to RAI 35, this support effectiveness criterion was not used for the OA contained in Return to Service Report Attachment 6, Appendix B.

RAI 44

In Reference 4, p. 15, Section 6.3, "Assumption," Item (1) "Fluid force," it is assumed there is no in-plane motion if the stability ratio (SR) is less than 1.0. How has MHI accounted for the potential that in-plane tube motion may occur at a SR less than 1.0 and how is the analysis result affected if a smaller value is used for this threshold?

RESPONSE

Note: RAI Reference 4 is "Analytical Evaluations for Operational Assessment," prepared by MHI, Document No. L5-04GA585, Revision 2.

RAI Reference 2 is "Evaluation of Stability Ratio for Return to Service," prepared by MHI, Document No. L5-04GA567, Revision 6.

RAI Reference 4, p. 15, Section 6.3, "Assumption," Item (1) "Fluid force," does not assume there is no in-plane tube motion when the SR is less than 1.0. The assumption is that no in-plane FEI occurs when the SR is less than 1.0. This is consistent with the definition of FEI.

How has MHI accounted for the potential that in-plane tube motion may occur at a SR less than 1.0?

RAI Reference 4 does not address the potential that in-plane tube motion may occur at a SR less than 1.0. The in-plane motion that occurs at SR less than 1.0 is accounted for in RAI Reference 2. The dynamic analysis model described in RAI Reference 2 allows for in-plane motion.

How is the analysis result affected if a smaller value is used for this threshold?

Stability analysis is performed subsequent to the calculation of required contact force. The stability ratio threshold has no effect on the contact force analysis result. In the response to RAI 35, we have explained that this derivation of contact force was not used in the Operational Assessment (OA) contained in Return to Service Report Attachment 6, Appendix B.

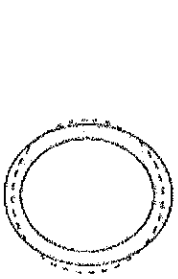
RAI 58

In Reference 3, Appendix 9, Table 6.2-1, which parameters are sampled randomly at each tube/AVB intersection? Why is this appropriate in lieu of assuming a functional relationship for each given parameter from tube to tube in a given column of tubes? For parameters (e.g., AVB twist) assumed to follow a functional relationship from tube to tube in the same column, provide the basis for the assumed relationship. For AVB twist, how does the assumed relationship relate to Figure 6.2-2?

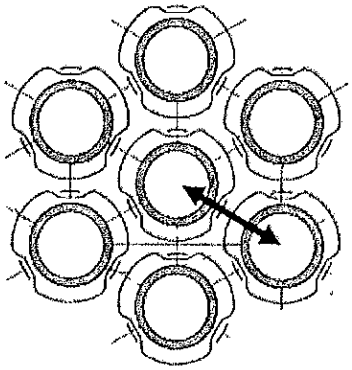
RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report." prepared by MHI, Document No. L5-04GA564, Revision 9.

Six parameters representing manufacturing variations were considered for the contact force analysis: tube ovality (G value), tube pitch, tube flatness, AVB thickness, AVB twist, and AVB flatness.

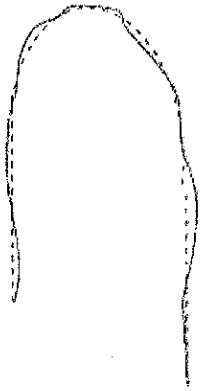


Tube G value

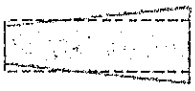


Tube pitch

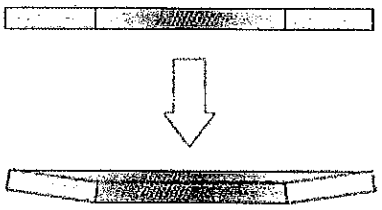
(True position of land)



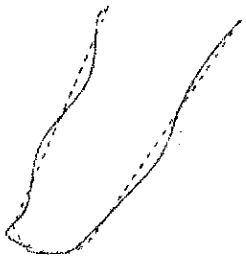
Tube Flatness



AVB thickness



AVB twist



AVB Flatness

The input values were randomly sampled at each tube/AVB intersection for the first four parameters. AVB twist was randomly sampled at each AVB and then varied at each tube intersection along the AVB following a functional relationship. AVB flatness was not used in contact force analysis. The basis for using either random sampling or a functional relationship for each parameter follows:

Tube Ovality (G value):
Tube ovality was randomly sampled at each tube/AVB intersection. The random distribution of tube ovality from tube-to-tube was based on actual tube manufacturing data which provide more accurate results than assuming a functional relationship.

Tube Pitch (TSP hole variation from true position):
The contact force model included the effect of tube pitch by using gap elements at TSP holes. The gap size was randomly sampled at each tube-to-TSP intersection at the top TSP from a distribution based on the fabrication tolerance for TSP hole pitch. Therefore, random sampling is more appropriate than assuming a functional relationship.

Tube Flatness:
Tube flatness was randomly sampled at each tube/AVB intersection from a distribution based on the fabrication tolerance. Random sampling for this parameter is appropriate because actual flatness varies randomly both from tube-to-tube and along the tube length.

AVB Thickness:
AVB thickness was randomly sampled at each tube/AVB intersection. As Table 6.2-1 shows, separate AVB thickness distributions were sampled for Unit 2 and Unit 3 based on measurement results. Therefore, random sampling is appropriate.

AVB Flatness:
AVB flatness was not used in the contact force analysis. AVB flatness variations have a negligible effect on contact forces.

AVB Twist:
AVB twist was randomly sampled as a property of each AVB, then varied systematically along the length of the AVB using a functional relationship. AVB twist is generated by bending a straight AVB bar during AVB manufacturing, as shown in the following figure. As a result of this process, an unloaded AVB (i.e., before insertion in the tube bundle) has a uniform twist along each straight leg.

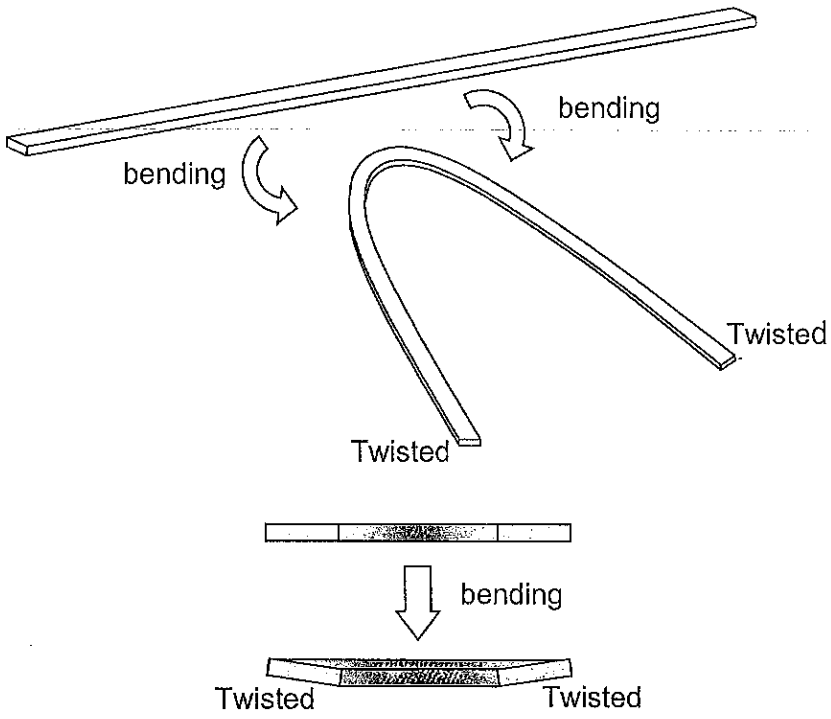


Figure 6.2-2 shows the functional form of the AVB twist factor that represents the variation of torsional stiffness along the length of an AVB in the contact force model. Since the AVB has uniform cross section, its torsional stiffness at each tube/AVB intersection along its length is inversely proportional to the distance of the intersection from the nose and retaining bar endpoints of the AVB. This is the reason for the characteristic "bathtub" shape of the AVB twist factor depicted in Figure 6.2-2. For more details regarding the basis for the AVB twist factor, please see the response to RAIs 64 through 66.

RAI 61

Reference 3, Appendix 9, Attachment 9-3, Figure 4.1.2-3. Discuss the pedigree of the data in this figure and how it differs from Reference 2, Figure 6-19 and 6-20. Please explain the differences between the Reference 3 versus the Reference 2 figures for dings exceeding 0.5 volts?

RESPONSE

Note: RAI Reference 3 is "Tube Wear of Unit-3 RSG – Technical Evaluation Report." prepared by MHI, Document No. L5-04GA564, Revision 9.

RAI Reference 2 is "SONGS U2C17 Steam Generator Operational Assessment for Tube-to-Tube Wear," prepared by Areva NP Inc. Document No. 51-9187230-000, Revision 0.

The data plotted in Figure 4.1.2-3 of Appendix 9, Attachment 9-3 in RAI Reference 3 and those in Figures 6-19 and 6-20 in RAI Reference 2 use the same Pre-Service Inspection Eddy Current Testing (ECT) data. The ECT data were obtained under AREVA's 10 CFR 50 Appendix B program for the Pre-Service Inspection and are retained under SONGS Steam Generator Program.

The differences between the figures in RAI References 2 and 3 are:

- The figures in RAI Reference 2 cover the signals on the U-bend region, which include the signals on freespan area and those at U-bend AVB locations but do not include the signals at TSP locations. The plotted data cover the voltage range from 0.5 to 1.5 Volts.
- The figures in RAI Reference 3 cover the signals on the locations of structures, which include the signals at U-bend AVB locations and those at TSP locations but do not include the signals on freespan area. The plotted data cover the full voltage range of the reported ding indications.

	RAI Reference 2 Figures 6-19 and 6-20	RAI Reference 3 Figure 4.1.2-3
Pre-service ECT Inspection Data	Yes	Yes
U-bend Freespan Dings	Yes	No
TSP Dings	No	Yes
AVB Dings < 0.5 Volts	No	Yes
AVB Dings 0.5-1.5 Volts	Yes	Yes
AVB Dings > 1.5 Volts	No	Yes

Despite these differences, the figures support the comparison of the relative numbers of contact signals in the upper bundle for Units 2 and 3 and demonstrate that contact forces are more significant in Unit 2 than in Unit 3.

BOARD NOTIFICATION ENCLOSURE 5

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

March 15, 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 42)
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. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 20, 2013, Request for Additional Information (RAIs 38-52) Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

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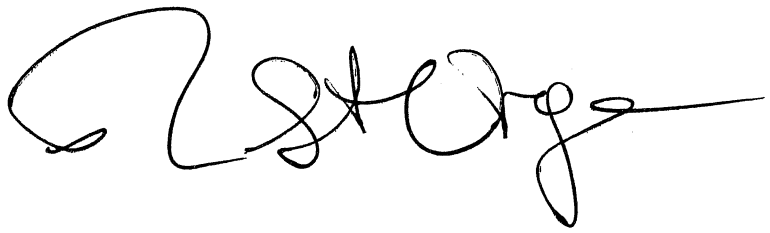
By email dated February 20, 2013 (Reference 3), the NRC issued Requests for Additional Information (RAI) regarding the CAL response. Enclosure 2 of this letter provides the response to RAI 42.

P.O. Box 128
San Clemente, CA 92672

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. Response to RAI 42

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

ENCLOSURE 1

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 42

RAI 42

In Reference 3, p. 4 (4 of 62), SCE does not conclusively state which screened tubes were actually plugged. Please discuss the threshold and implementation of the criteria (with exceptions) and provide or refer to a list of confirmed plugged tubes in Unit 2.

RESPONSE

Note: RAI Reference 3 is MHI Document L5-04GA571, "Screening Criteria for Susceptibility to In-Plane Tube Motion," Revision 6, dated October 3, 2012.

Conclusively state which screened tubes were plugged

All tubes with an aggregate score at or above the threshold screening level were plugged. The Unit 2 steam generator (SG) tubes meeting the screening criteria from RAI Reference 3 are listed in Table 15, for SG 2E-089, and Table 16, for SG 2E-088.

Discuss the threshold and implementation of the criteria (with exceptions)

RAI Reference 3 identified nine screening criteria found to indicate susceptibility to tube-to-tube wear (TTW) from Unit 3 results:

1. COUNT - Number of wear indications at anti-vibration bar (AVB) intersections
2. HOT COUNT - Number of AVB wear indications on the hot leg side of U-bend
3. HIGH/LOW - Wear indications at AVB bars B01/B02 and B11/B12
4. CONTINUOUS -Number of consecutive AVB wear indications
5. TSP -Wear indications at upper tube support plate (TSP) intersections (TSP 5, 6 and 7)
6. LENGTH - Length of AVB wear scars as determined from bobbin coil inspection data
7. VOID - Average void fraction that the tube is exposed to in U-bend region
8. REGION - Distance to center of AVB wear area
9. COUPLING - Coupling effect between adjacent tubes (i.e., proximity to tubes that screen in for plugging)

Details of the nine screening criteria are described in RAI Reference 3, Section 3, "Proposed screening criteria based on Unit 3 results."

Weighting factors for each of the nine criteria were developed based on the proportion of Unit 3 tubes meeting the criteria that exhibited TTW. Individual thresholds were not set for each criterion. Instead, all nine weighting factors were aggregated to produce a combined, tube-specific TTW susceptibility score. Using the examination data from the 326 tubes found with TTW in Unit 3, a threshold screening level was established such that the combined TTW susceptibility scores of all tubes exhibiting TTW were above the threshold screening level. This assured that the false negative rate for the threshold screening level was zero.

The screening criteria were applied to tubes in both Unit 2 SGs, and 99 tubes in SG 2E-088 and 203 tubes in SG 2E-089 were identified with combined TTW susceptibility scores above the threshold screening level. Further validating the screening criteria approach, the 203 screened tubes in SG 2E-089 included both tubes in SG 2E-089 found with TTW (no tubes in SG 2E-088 were found with TTW).

No exceptions were taken to the screening criteria. However, additional tubes were selected for preventative plugging based on recommendations from vendors and industry experts. Refer to Table 8-4 of the CAL Response, Enclosure 2, SONGS Unit 2 Return to Service Report.

Provide a list of confirmed plugged tubes in Unit 2

SONGS Nuclear Engineering Change Package (NECP) 800873488, Revision 0, Affected Section Change (ASC) D0062286, contains lists of the confirmed plugged tubes in Unit 2. The following pages provide the tube plugging lists excerpted from this NECP. The highlighted tubes were those recommended for plugging in RAI Reference 3, Tables 15 and 16.

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
112	88	Yes	Single	668	35% TWD AVB
133	91	Yes	Single	668	35% TWD AVB
124	48	Yes	Single	668	47% TWD - Retainer Bar
125	49	Yes	Single	668	54% TWD - Retainer Bar
120	92	Yes	Single	668	Preventative - AVB
128	94	Yes	Single	668	Preventative - AVB
121	81	Yes	Split	Note c	Preventative - FSW
120	82	Yes	Split	Note c	Preventative - FSW
105	83	Yes	Split	Note c	Preventative - FSW
107	83	Yes	Split	Note c	Preventative - FSW
104	84	Yes	Split	Note c	Preventative - FSW
106	84	Yes	Split	Note c	Preventative - FSW
108	84	Yes	Split	Note c	Preventative - FSW
122	84	Yes	Split	Note c	Preventative - FSW
97	85	Yes	Split	Note c	Preventative - FSW
99	85	Yes	Split	Note c	Preventative - FSW
103	85	Yes	Split	Note c	Preventative - FSW
105	85	Yes	Split	Note c	Preventative - FSW
107	85	Yes	Split	Note c	Preventative - FSW
115	85	Yes	Split	Note c	Preventative - FSW
121	85	Yes	Split	Note c	Preventative - FSW
123	85	Yes	Split	Note c	Preventative - FSW
133	85	Yes	Split	Note c	Preventative - FSW
98	86	Yes	Split	Note c	Preventative - FSW
100	86	Yes	Split	Note c	Preventative - FSW
102	86	Yes	Split	Note c	Preventative - FSW
104	86	Yes	Split	Note c	Preventative - FSW
106	86	Yes	Split	Note c	Preventative - FSW
108	86	Yes	Split	Note c	Preventative - FSW
112	86	Yes	Split	Note c	Preventative - FSW
114	86	Yes	Split	Note c	Preventative - FSW
116	86	Yes	Split	Note c	Preventative - FSW
122	86	Yes	Split	Note c	Preventative - FSW
124	86	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
126	86	Yes	Split	Note c	Preventative - FSW
101	87	Yes	Split	Note c	Preventative - FSW
103	87	Yes	Split	Note c	Preventative - FSW
105	87	Yes	Split	Note c	Preventative - FSW
111	87	Yes	Split	Note c	Preventative - FSW
113	87	Yes	Split	Note c	Preventative - FSW
115	87	Yes	Split	Note c	Preventative - FSW
121	87	Yes	Split	Note c	Preventative - FSW
123	87	Yes	Split	Note c	Preventative - FSW
125	87	Yes	Split	Note c	Preventative - FSW
100	88	Yes	Split	Note c	Preventative - FSW
102	88	Yes	Split	Note c	Preventative - FSW
104	88	Yes	Split	Note c	Preventative - FSW
106	88	Yes	Split	Note c	Preventative - FSW
110	88	Yes	Split	Note c	Preventative - FSW
114	88	Yes	Split	Note c	Preventative - FSW
116	88	Yes	Split	Note c	Preventative - FSW
118	88	Yes	Split	Note c	Preventative - FSW
120	88	Yes	Split	Note c	Preventative - FSW
122	88	Yes	Split	Note c	Preventative - FSW
124	88	Yes	Split	Note c	Preventative - FSW
95	89	Yes	Split	Note c	Preventative - FSW
101	89	Yes	Split	Note c	Preventative - FSW
103	89	Yes	Split	Note c	Preventative - FSW
105	89	Yes	Split	Note c	Preventative - FSW
107	89	Yes	Split	Note c	Preventative - FSW
111	89	Yes	Split	Note c	Preventative - FSW
113	89	Yes	Split	Note c	Preventative - FSW
115	89	Yes	Split	Note c	Preventative - FSW
117	89	Yes	Split	Note c	Preventative - FSW
119	89	Yes	Split	Note c	Preventative - FSW
121	89	Yes	Split	Note c	Preventative - FSW
123	89	Yes	Split	Note c	Preventative - FSW
127	89	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
94	90	Yes	Split	Note c	Preventative - FSW
100	90	Yes	Split	Note c	Preventative - FSW
102	90	Yes	Split	Note c	Preventative - FSW
104	90	Yes	Split	Note c	Preventative - FSW
106	90	Yes	Split	Note c	Preventative - FSW
110	90	Yes	Split	Note c	Preventative - FSW
112	90	Yes	Split	Note c	Preventative - FSW
114	90	Yes	Split	Note c	Preventative - FSW
116	90	Yes	Split	Note c	Preventative - FSW
95	91	Yes	Split	Note c	Preventative - FSW
101	91	Yes	Split	Note c	Preventative - FSW
103	91	Yes	Split	Note c	Preventative - FSW
105	91	Yes	Split	Note c	Preventative - FSW
107	91	Yes	Split	Note c	Preventative - FSW
109	91	Yes	Split	Note c	Preventative - FSW
111	91	Yes	Split	Note c	Preventative - FSW
113	91	Yes	Split	Note c	Preventative - FSW
115	91	Yes	Split	Note c	Preventative - FSW
117	91	Yes	Split	Note c	Preventative - FSW
98	92	Yes	Split	Note c	Preventative - FSW
100	92	Yes	Split	Note c	Preventative - FSW
102	92	Yes	Split	Note c	Preventative - FSW
104	92	Yes	Split	Note c	Preventative - FSW
106	92	Yes	Split	Note c	Preventative - FSW
108	92	Yes	Split	Note c	Preventative - FSW
110	92	Yes	Split	Note c	Preventative - FSW
112	92	Yes	Split	Note c	Preventative - FSW
114	92	Yes	Split	Note c	Preventative - FSW
116	92	Yes	Split	Note c	Preventative - FSW
118	92	Yes	Split	Note c	Preventative - FSW
136	92	Yes	Split	Note c	Preventative - FSW
99	93	Yes	Split	Note c	Preventative - FSW
101	93	Yes	Split	Note c	Preventative - FSW
103	93	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
107	93	Yes	Split	Note c	Preventative - FSW
111	93	Yes	Split	Note c	Preventative - FSW
117	93	Yes	Split	Note c	Preventative - FSW
129	93	Yes	Split	Note c	Preventative - FSW
94	94	Yes	Split	Note c	Preventative - FSW
135	93	Yes	Split	Note c	Preventative – FSW[d]
137	89	Yes	Split	Note c	Preventative – FSW[d]
108	34	Yes	None	-	Preventative - Retainer Bar
110	34	Yes	Single	668	Preventative - Retainer Bar
111	35	Yes	None	-	Preventative - Retainer Bar
109	35	Yes	Single	668	Preventative - Retainer Bar
110	36	Yes	None	-	Preventative - Retainer Bar
112	36	Yes	None	-	Preventative - Retainer Bar
111	37	Yes	None	-	Preventative - Retainer Bar
113	37	Yes	None	-	Preventative - Retainer Bar
112	38	Yes	None	-	Preventative - Retainer Bar
114	38	Yes	None	-	Preventative - Retainer Bar
113	39	Yes	None	-	Preventative - Retainer Bar
115	39	Yes	None	-	Preventative - Retainer Bar
114	40	Yes	None	-	Preventative - Retainer Bar
116	40	Yes	None	-	Preventative - Retainer Bar
115	41	Yes	None	-	Preventative - Retainer Bar
117	41	Yes	None	-	Preventative - Retainer Bar
116	42	Yes	None	-	Preventative - Retainer Bar
118	42	Yes	None	-	Preventative - Retainer Bar
117	43	Yes	None	-	Preventative - Retainer Bar
119	43	Yes	None	-	Preventative - Retainer Bar
118	44	Yes	None	-	Preventative - Retainer Bar
120	44	Yes	None	-	Preventative - Retainer Bar
119	45	Yes	None	-	Preventative - Retainer Bar
121	45	Yes	Single	668	Preventative - Retainer Bar
122	46	Yes	None	-	Preventative - Retainer Bar
120	46	Yes	Single	668	Preventative - Retainer Bar
121	47	Yes	None	-	Preventative - Retainer Bar

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
123	47	Yes	None	-	Preventative - Retainer Bar
122	48	Yes	None	-	Preventative - Retainer Bar
123	49	Yes	None	-	Preventative - Retainer Bar
124	50	Yes	None	-	Preventative - Retainer Bar
126	50	Yes	None	-	Preventative - Retainer Bar
125	51	Yes	None	-	Preventative - Retainer Bar
127	51	Yes	None	-	Preventative - Retainer Bar
126	52	Yes	None	-	Preventative - Retainer Bar
128	52	Yes	None	-	Preventative - Retainer Bar
127	53	Yes	None	-	Preventative - Retainer Bar
129	53	Yes	None	-	Preventative - Retainer Bar
128	54	Yes	None	-	Preventative - Retainer Bar
130	54	Yes	None	-	Preventative - Retainer Bar
129	55	Yes	None	-	Preventative - Retainer Bar
131	55	Yes	None	-	Preventative - Retainer Bar
130	56	Yes	Single	668	Preventative - Retainer Bar
132	56	Yes	Single	668	Preventative - Retainer Bar
131	57	Yes	None	-	Preventative - Retainer Bar
131	121	Yes	None	-	Preventative - Retainer Bar
130	122	Yes	Single	668	Preventative - Retainer Bar
132	122	Yes	Single	668	Preventative - Retainer Bar
129	123	Yes	None	-	Preventative - Retainer Bar
131	123	Yes	None	-	Preventative - Retainer Bar
128	124	Yes	None	-	Preventative - Retainer Bar
130	124	Yes	None	-	Preventative - Retainer Bar
127	125	Yes	None	-	Preventative - Retainer Bar
129	125	Yes	None	-	Preventative - Retainer Bar
126	126	Yes	None	-	Preventative - Retainer Bar
128	126	Yes	None	-	Preventative - Retainer Bar
125	127	Yes	None	-	Preventative - Retainer Bar
127	127	Yes	None	-	Preventative - Retainer Bar
124	128	Yes	None	-	Preventative - Retainer Bar
126	128	Yes	None	-	Preventative - Retainer Bar
123	129	Yes	None	-	Preventative - Retainer Bar

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
125	129	Yes	None	-	Preventative - Retainer Bar
122	130	Yes	None	-	Preventative - Retainer Bar
124	130	Yes	None	-	Preventative - Retainer Bar
121	131	Yes	None	-	Preventative - Retainer Bar
123	131	Yes	None	-	Preventative - Retainer Bar
122	132	Yes	None	-	Preventative - Retainer Bar
120	132	Yes	Single	668	Preventative - Retainer Bar
119	133	Yes	None	-	Preventative - Retainer Bar
121	133	Yes	Single	668	Preventative - Retainer Bar
118	134	Yes	None	-	Preventative - Retainer Bar
120	134	Yes	None	-	Preventative - Retainer Bar
117	135	Yes	None	-	Preventative - Retainer Bar
119	135	Yes	None	-	Preventative - Retainer Bar
116	136	Yes	None	-	Preventative - Retainer Bar
118	136	Yes	None	-	Preventative - Retainer Bar
115	137	Yes	None	-	Preventative - Retainer Bar
117	137	Yes	None	-	Preventative - Retainer Bar
114	138	Yes	None	-	Preventative - Retainer Bar
116	138	Yes	None	-	Preventative - Retainer Bar
113	139	Yes	None	-	Preventative - Retainer Bar
115	139	Yes	None	-	Preventative - Retainer Bar
112	140	Yes	None	-	Preventative - Retainer Bar
114	140	Yes	None	-	Preventative - Retainer Bar
111	141	Yes	None	-	Preventative - Retainer Bar
113	141	Yes	None	-	Preventative - Retainer Bar
110	142	Yes	None	-	Preventative - Retainer Bar
112	142	Yes	None	-	Preventative - Retainer Bar
111	143	Yes	None	-	Preventative - Retainer Bar
109	143	Yes	Single	668	Preventative - Retainer Bar
108	144	Yes	None	-	Preventative - Retainer Bar
110	144	Yes	Single	668	Preventative - Retainer Bar
98	84	Yes	Split	Note c	Wear at 6 Continuous AVBs
88	88	Yes	Split	Note c	Wear at 6 Continuous AVBs
97	89	Yes	Split	Note c	Wear at 6 Continuous AVBs

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-088 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
108	90	Yes	Split	Note c	Wear at 6 Continuous AVBs
124	92	Yes	Split	Note c	Wear at 6 Continuous AVBs
134	94	Yes	Split	Note c	Wear at 6 Continuous AVBs

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
111	81	Yes	Split	Note c	14% TWD – FSW (Preventative)
113	81	Yes	Split	Note c	14% TWD – FSW (Preventative)
127	127	Yes	Single	668	38% TWD - Retainer Bar
119	133	Yes	Single	668	90% TWD - Retainer Bar
103	77	Yes	Split	Note c	Preventative - FSW
109	77	Yes	Split	Note c	Preventative - FSW
111	77	Yes	Split	Note c	Preventative - FSW
100	78	Yes	Split	Note c	Preventative - FSW
102	78	Yes	Split	Note c	Preventative - FSW
104	78	Yes	Split	Note c	Preventative - FSW
108	78	Yes	Split	Note c	Preventative - FSW
110	78	Yes	Split	Note c	Preventative - FSW
112	78	Yes	Split	Note c	Preventative - FSW
97	79	Yes	Split	Note c	Preventative - FSW
99	79	Yes	Split	Note c	Preventative - FSW
101	79	Yes	Split	Note c	Preventative - FSW
111	79	Yes	Split	Note c	Preventative - FSW
92	80	Yes	Split	Note c	Preventative - FSW
94	80	Yes	Split	Note c	Preventative - FSW
96	80	Yes	Split	Note c	Preventative - FSW
98	80	Yes	Split	Note c	Preventative - FSW
100	80	Yes	Split	Note c	Preventative - FSW
102	80	Yes	Split	Note c	Preventative - FSW
110	80	Yes	Split	Note c	Preventative - FSW
112	80	Yes	Split	Note c	Preventative - FSW
114	80	Yes	Split	Note c	Preventative - FSW
91	81	Yes	Split	Note c	Preventative - FSW
93	81	Yes	Split	Note c	Preventative - FSW
95	81	Yes	Split	Note c	Preventative - FSW
97	81	Yes	Split	Note c	Preventative - FSW
99	81	Yes	Split	Note c	Preventative - FSW
101	81	Yes	Split	Note c	Preventative - FSW
103	81	Yes	Split	Note c	Preventative - FSW
105	81	Yes	Split	Note c	Preventative - FSW
107	81	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service

b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube

c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths

d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
109	81	Yes	Split	Note c	Preventative - FSW
115	81	Yes	Split	Note c	Preventative - FSW
117	81	Yes	Split	Note c	Preventative - FSW
119	81	Yes	Split	Note c	Preventative - FSW
121	81	Yes	Split	Note c	Preventative - FSW
90	82	Yes	Split	Note c	Preventative - FSW
92	82	Yes	Split	Note c	Preventative - FSW
94	82	Yes	Split	Note c	Preventative - FSW
96	82	Yes	Split	Note c	Preventative - FSW
98	82	Yes	Split	Note c	Preventative - FSW
100	82	Yes	Split	Note c	Preventative - FSW
102	82	Yes	Split	Note c	Preventative - FSW
104	82	Yes	Split	Note c	Preventative - FSW
106	82	Yes	Split	Note c	Preventative - FSW
108	82	Yes	Split	Note c	Preventative - FSW
110	82	Yes	Split	Note c	Preventative - FSW
112	82	Yes	Split	Note c	Preventative - FSW
114	82	Yes	Split	Note c	Preventative - FSW
116	82	Yes	Split	Note c	Preventative - FSW
118	82	Yes	Split	Note c	Preventative - FSW
120	82	Yes	Split	Note c	Preventative - FSW
122	82	Yes	Split	Note c	Preventative - FSW
91	83	Yes	Split	Note c	Preventative - FSW
93	83	Yes	Split	Note c	Preventative - FSW
95	83	Yes	Split	Note c	Preventative - FSW
97	83	Yes	Split	Note c	Preventative - FSW
99	83	Yes	Split	Note c	Preventative - FSW
101	83	Yes	Split	Note c	Preventative - FSW
103	83	Yes	Split	Note c	Preventative - FSW
105	83	Yes	Split	Note c	Preventative - FSW
107	83	Yes	Split	Note c	Preventative - FSW
109	83	Yes	Split	Note c	Preventative - FSW
111	83	Yes	Split	Note c	Preventative - FSW
113	83	Yes	Split	Note c	Preventative - FSW
115	83	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
117	83	Yes	Split	Note c	Preventative - FSW
119	83	Yes	Split	Note c	Preventative - FSW
121	83	Yes	Split	Note c	Preventative - FSW
90	84	Yes	Split	Note c	Preventative - FSW
92	84	Yes	Split	Note c	Preventative - FSW
94	84	Yes	Split	Note c	Preventative - FSW
96	84	Yes	Split	Note c	Preventative - FSW
98	84	Yes	Split	Note c	Preventative - FSW
100	84	Yes	Split	Note c	Preventative - FSW
102	84	Yes	Split	Note c	Preventative - FSW
104	84	Yes	Split	Note c	Preventative - FSW
106	84	Yes	Split	Note c	Preventative - FSW
108	84	Yes	Split	Note c	Preventative - FSW
110	84	Yes	Split	Note c	Preventative - FSW
112	84	Yes	Split	Note c	Preventative - FSW
114	84	Yes	Split	Note c	Preventative - FSW
116	84	Yes	Split	Note c	Preventative - FSW
118	84	Yes	Split	Note c	Preventative - FSW
120	84	Yes	Split	Note c	Preventative - FSW
126	84	Yes	Split	Note c	Preventative - FSW
128	84	Yes	Split	Note c	Preventative - FSW
132	84	Yes	Split	Note c	Preventative - FSW
91	85	Yes	Split	Note c	Preventative - FSW
93	85	Yes	Split	Note c	Preventative - FSW
95	85	Yes	Split	Note c	Preventative - FSW
97	85	Yes	Split	Note c	Preventative - FSW
99	85	Yes	Split	Note c	Preventative - FSW
101	85	Yes	Split	Note c	Preventative - FSW
103	85	Yes	Split	Note c	Preventative - FSW
105	85	Yes	Split	Note c	Preventative - FSW
107	85	Yes	Split	Note c	Preventative - FSW
109	85	Yes	Split	Note c	Preventative - FSW
111	85	Yes	Split	Note c	Preventative - FSW
113	85	Yes	Split	Note c	Preventative - FSW
115	85	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service

b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube

c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths

d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
117	85	Yes	Split	Note c	Preventative - FSW
119	85	Yes	Split	Note c	Preventative - FSW
121	85	Yes	Split	Note c	Preventative - FSW
127	85	Yes	Split	Note c	Preventative - FSW
88	86	Yes	Split	Note c	Preventative - FSW
92	86	Yes	Split	Note c	Preventative - FSW
94	86	Yes	Split	Note c	Preventative - FSW
96	86	Yes	Split	Note c	Preventative - FSW
98	86	Yes	Split	Note c	Preventative - FSW
100	86	Yes	Split	Note c	Preventative - FSW
102	86	Yes	Split	Note c	Preventative - FSW
104	86	Yes	Split	Note c	Preventative - FSW
106	86	Yes	Split	Note c	Preventative - FSW
108	86	Yes	Split	Note c	Preventative - FSW
110	86	Yes	Split	Note c	Preventative - FSW
112	86	Yes	Split	Note c	Preventative - FSW
114	86	Yes	Split	Note c	Preventative - FSW
116	86	Yes	Split	Note c	Preventative - FSW
118	86	Yes	Split	Note c	Preventative - FSW
122	86	Yes	Split	Note c	Preventative - FSW
130	86	Yes	Split	Note c	Preventative - FSW
93	87	Yes	Split	Note c	Preventative - FSW
95	87	Yes	Split	Note c	Preventative - FSW
97	87	Yes	Split	Note c	Preventative - FSW
99	87	Yes	Split	Note c	Preventative - FSW
101	87	Yes	Split	Note c	Preventative - FSW
103	87	Yes	Split	Note c	Preventative - FSW
105	87	Yes	Split	Note c	Preventative - FSW
107	87	Yes	Split	Note c	Preventative - FSW
109	87	Yes	Split	Note c	Preventative - FSW
111	87	Yes	Split	Note c	Preventative - FSW
113	87	Yes	Split	Note c	Preventative - FSW
115	87	Yes	Split	Note c	Preventative - FSW
117	87	Yes	Split	Note c	Preventative - FSW
119	87	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
129	87	Yes	Split	Note c	Preventative - FSW
94	88	Yes	Split	Note c	Preventative - FSW
96	88	Yes	Split	Note c	Preventative - FSW
98	88	Yes	Split	Note c	Preventative - FSW
100	88	Yes	Split	Note c	Preventative - FSW
102	88	Yes	Split	Note c	Preventative - FSW
104	88	Yes	Split	Note c	Preventative - FSW
106	88	Yes	Split	Note c	Preventative - FSW
108	88	Yes	Split	Note c	Preventative - FSW
110	88	Yes	Split	Note c	Preventative - FSW
112	88	Yes	Split	Note c	Preventative - FSW
114	88	Yes	Split	Note c	Preventative - FSW
116	88	Yes	Split	Note c	Preventative - FSW
118	88	Yes	Split	Note c	Preventative - FSW
138	88	Yes	Split	Note c	Preventative - FSW
95	89	Yes	Split	Note c	Preventative - FSW
97	89	Yes	Split	Note c	Preventative - FSW
99	89	Yes	Split	Note c	Preventative - FSW
101	89	Yes	Split	Note c	Preventative - FSW
103	89	Yes	Split	Note c	Preventative - FSW
105	89	Yes	Split	Note c	Preventative - FSW
107	89	Yes	Split	Note c	Preventative - FSW
109	89	Yes	Split	Note c	Preventative - FSW
111	89	Yes	Split	Note c	Preventative - FSW
113	89	Yes	Split	Note c	Preventative - FSW
115	89	Yes	Split	Note c	Preventative - FSW
117	89	Yes	Split	Note c	Preventative - FSW
131	89	Yes	Split	Note c	Preventative - FSW
100	90	Yes	Split	Note c	Preventative - FSW
102	90	Yes	Split	Note c	Preventative - FSW
104	90	Yes	Split	Note c	Preventative - FSW
106	90	Yes	Split	Note c	Preventative - FSW
108	90	Yes	Split	Note c	Preventative - FSW
110	90	Yes	Split	Note c	Preventative - FSW
112	90	Yes	Split	Note c	Preventative - FSW

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
114	90	Yes	Split	Note c	Preventative - FSW
116	90	Yes	Split	Note c	Preventative - FSW
118	90	Yes	Split	Note c	Preventative - FSW
130	90	Yes	Split	Note c	Preventative - FSW
132	90	Yes	Split	Note c	Preventative - FSW
134	90	Yes	Split	Note c	Preventative - FSW
99	91	Yes	Split	Note c	Preventative - FSW
105	91	Yes	Split	Note c	Preventative - FSW
107	91	Yes	Split	Note c	Preventative - FSW
109	91	Yes	Split	Note c	Preventative - FSW
113	91	Yes	Split	Note c	Preventative - FSW
115	91	Yes	Split	Note c	Preventative - FSW
117	91	Yes	Split	Note c	Preventative - FSW
123	91	Yes	Split	Note c	Preventative - FSW
98	92	Yes	Split	Note c	Preventative - FSW
104	92	Yes	Split	Note c	Preventative - FSW
108	92	Yes	Split	Note c	Preventative - FSW
114	92	Yes	Split	Note c	Preventative - FSW
116	92	Yes	Split	Note c	Preventative - FSW
103	93	Yes	Split	Note c	Preventative - FSW
115	93	Yes	Split	Note c	Preventative - FSW
102	94	Yes	Split	Note c	Preventative - FSW
114	94	Yes	Split	Note c	Preventative - FSW
116	94	Yes	Split	Note c	Preventative - FSW
103	95	Yes	Split	Note c	Preventative - FSW
105	95	Yes	Split	Note c	Preventative - FSW
107	95	Yes	Split	Note c	Preventative - FSW
109	95	Yes	Split	Note c	Preventative - FSW
115	95	Yes	Split	Note c	Preventative - FSW
109	97	Yes	Split	Note c	Preventative - FSW
110	98	Yes	Split	Note c	Preventative - FSW
112	98	Yes	Split	Note c	Preventative - FSW
80	68	Yes	Split	Note c	Preventative – FSW[d]
104	72	Yes	Split	Note c	Preventative – FSW[d]
132	94	Yes	Split	Note c	Preventative – FSW[d]

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service

b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube

c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths

d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
108	34	Yes	None	-	Preventative - Retainer Bar
110	34	Yes	Single	668	Preventative - Retainer Bar
111	35	Yes	None	-	Preventative - Retainer Bar
109	35	Yes	Single	668	Preventative - Retainer Bar
110	36	Yes	None	-	Preventative - Retainer Bar
112	36	Yes	None	-	Preventative - Retainer Bar
111	37	Yes	None	-	Preventative - Retainer Bar
113	37	Yes	None	-	Preventative - Retainer Bar
112	38	Yes	None	-	Preventative - Retainer Bar
114	38	Yes	None	-	Preventative - Retainer Bar
113	39	Yes	None	-	Preventative - Retainer Bar
115	39	Yes	None	-	Preventative - Retainer Bar
114	40	Yes	None	-	Preventative - Retainer Bar
116	40	Yes	None	-	Preventative - Retainer Bar
115	41	Yes	None	-	Preventative - Retainer Bar
117	41	Yes	None	-	Preventative - Retainer Bar
116	42	Yes	None	-	Preventative - Retainer Bar
118	42	Yes	None	-	Preventative - Retainer Bar
117	43	Yes	None	-	Preventative - Retainer Bar
119	43	Yes	None	-	Preventative - Retainer Bar
120	44	Yes	None	-	Preventative - Retainer Bar
118	44	Yes	Single	668	Preventative - Retainer Bar
119	45	Yes	None	-	Preventative - Retainer Bar
121	45	Yes	Single	668	Preventative - Retainer Bar
122	46	Yes	None	-	Preventative - Retainer Bar
120	46	Yes	Single	668	Preventative - Retainer Bar
121	47	Yes	None	-	Preventative - Retainer Bar
123	47	Yes	None	-	Preventative - Retainer Bar
122	48	Yes	None	-	Preventative - Retainer Bar
124	48	Yes	None	-	Preventative - Retainer Bar
123	49	Yes	None	-	Preventative - Retainer Bar
125	49	Yes	None	-	Preventative - Retainer Bar
124	50	Yes	None	-	Preventative - Retainer Bar
126	50	Yes	None	-	Preventative - Retainer Bar
125	51	Yes	None	-	Preventative - Retainer Bar

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
127	51	Yes	None	-	Preventative - Retainer Bar
126	52	Yes	None	-	Preventative - Retainer Bar
128	52	Yes	None	-	Preventative - Retainer Bar
127	53	Yes	None	-	Preventative - Retainer Bar
129	53	Yes	None	-	Preventative - Retainer Bar
128	54	Yes	None	-	Preventative - Retainer Bar
130	54	Yes	None	-	Preventative - Retainer Bar
129	55	Yes	None	-	Preventative - Retainer Bar
131	55	Yes	None	-	Preventative - Retainer Bar
130	56	Yes	Single	668	Preventative - Retainer Bar
132	56	Yes	Single	668	Preventative - Retainer Bar
131	57	Yes	None	-	Preventative - Retainer Bar
131	121	Yes	None	-	Preventative - Retainer Bar
130	122	Yes	Single	668	Preventative - Retainer Bar
132	122	Yes	Single	668	Preventative - Retainer Bar
129	123	Yes	None	-	Preventative - Retainer Bar
131	123	Yes	None	-	Preventative - Retainer Bar
128	124	Yes	None	-	Preventative - Retainer Bar
130	124	Yes	None	-	Preventative - Retainer Bar
127	125	Yes	None	-	Preventative - Retainer Bar
129	125	Yes	None	-	Preventative - Retainer Bar
126	126	Yes	None	-	Preventative - Retainer Bar
128	126	Yes	None	-	Preventative - Retainer Bar
125	127	Yes	None	-	Preventative - Retainer Bar
124	128	Yes	None	-	Preventative - Retainer Bar
126	128	Yes	None	-	Preventative - Retainer Bar
123	129	Yes	None	-	Preventative - Retainer Bar
125	129	Yes	None	-	Preventative - Retainer Bar
122	130	Yes	None	-	Preventative - Retainer Bar
124	130	Yes	None	-	Preventative - Retainer Bar
121	131	Yes	None	-	Preventative - Retainer Bar
123	131	Yes	None	-	Preventative - Retainer Bar
122	132	Yes	None	-	Preventative - Retainer Bar
120	132	Yes	Single	668	Preventative - Retainer Bar
121	133	Yes	Single	668	Preventative - Retainer Bar

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

U2 NECP 800873488					
RSG 2E-089 Tube Plugging/Stabilizing List[a]					
Row	Col	Plug	Stab Type[b]	Stab Length (in)	Reason
118	134	Yes	None	-	Preventative - Retainer Bar
120	134	Yes	None	-	Preventative - Retainer Bar
117	135	Yes	None	-	Preventative - Retainer Bar
119	135	Yes	None	-	Preventative - Retainer Bar
116	136	Yes	None	-	Preventative - Retainer Bar
118	136	Yes	None	-	Preventative - Retainer Bar
115	137	Yes	None	-	Preventative - Retainer Bar
117	137	Yes	None	-	Preventative - Retainer Bar
114	138	Yes	None	-	Preventative - Retainer Bar
116	138	Yes	None	-	Preventative - Retainer Bar
113	139	Yes	None	-	Preventative - Retainer Bar
115	139	Yes	None	-	Preventative - Retainer Bar
112	140	Yes	None	-	Preventative - Retainer Bar
114	140	Yes	None	-	Preventative - Retainer Bar
111	141	Yes	None	-	Preventative - Retainer Bar
113	141	Yes	None	-	Preventative - Retainer Bar
110	142	Yes	None	-	Preventative - Retainer Bar
112	142	Yes	None	-	Preventative - Retainer Bar
111	143	Yes	None	-	Preventative - Retainer Bar
109	143	Yes	Single	668	Preventative - Retainer Bar
108	144	Yes	None	-	Preventative - Retainer Bar
110	144	Yes	Single	668	Preventative - Retainer Bar
98	76	Yes	Split	Note c	Wear at 6 Continuous AVBs
87	79	Yes	Split	Note c	Wear at 6 Continuous AVBs
89	83	Yes	Split	Note c	Wear at 6 Continuous AVBs
122	84	Yes	Split	Note c	Wear at 6 Continuous AVBs
121	89	Yes	Split	Note c	Wear at 6 Continuous AVBs
120	90	Yes	Split	Note c	Wear at 6 Continuous AVBs

a) From AREVA Steam Generator Eddy Current Final Report – San Onofre Nuclear Generating Station (SONGS) Unit 2 – Steam Generators 88 & 89 – 2012-U2C17 & Return to Service
b) Single stabilizers are installed on the hot side of the tube, split stabilizers are installed on the hot and cold side of the tube
c) See AREVA Product Information Sheet for Stabilizer U-Bend (Ref. 15) for split stabilizer lengths
d) Conservatively plugged as a defense in depth action per Westinghouse recommendation (Ref. 23)

BOARD NOTIFICATION ENCLOSURE 6

SOUTHERN CALIFORNIA EDISON®
An *EDISON INTERNATIONAL*® Company

Proprietary Information
Withhold from Public Disclosure

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

March 22, 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 (RAIs 46 - 49, 51, and 52)
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 March 18, 2013, Second 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 March 18, 2013 (Reference 3), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 2 of this letter provides the response to RAIs 46 - 49, 51, and 52.

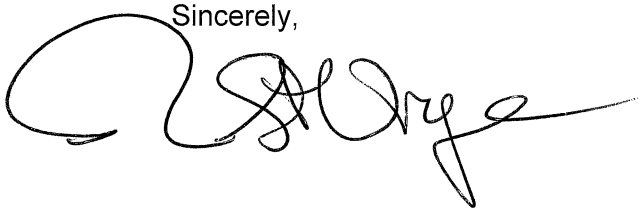
Proprietary Information
Withhold from Public Disclosure
Decontrolled Upon Removal of Enclosure 2

P.O. Box 128
San Clemente, CA 92672

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 notarized affidavits from Westinghouse, which sets forth the basis on which the information in Enclosure 2 may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed by paragraph (b)(4) of 10 CFR 2.390. 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 Affidavits
2. Response to RAIs 46 - 49, 51, and 52 (Proprietary)
3. Response to RAIs 46 - 49, 51, and 52 (Non-Proprietary)

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

ENCLOSURE 1

Notarized Affidavits

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: CONO-13-22

CAW-13-3657

March 15, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-13-28 P-Attachment, "San Onofre Nuclear Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 46" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3657 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern California Edison.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3657 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-13-3657

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 15th day of March 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGDA-13-28 P-Attachment, "San Onofre Nuclear Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 46," dated March 14, 2013, for submittal to the Commission, being transmitted by Southern California Edison Letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the calculation of fluidelastic excitation of steam generator tubes and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information regarding the justification for selection of the threshold value of the fluidelastic instability constant, and to provide an explanation why it is a conservative selection considering the thermal hydraulic conditions and size of the San Onofre Nuclear Generating Station Unit 2 replacement steam generators.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating the impact of fluidelastic excitation on steam generator tube integrity.

(b) Westinghouse can sell support and defense of the thermal hydraulic analysis of secondary side flow field in the steam generator shell.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: CONO-13-22

CAW-13-3658

March 15, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-13-26 P-Attachment, "San Onofre Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 47" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3658 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern California Edison.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3658 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-13-3658

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 15th day of March 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGDA-13-26 P-Attachment, "San Onofre Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 47" dated March 14, 2013, for submittal to the Commission, being transmitted by Southern California Edison Letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the calculation of fluidelastic excitation of steam generator tubes and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information regarding the development of damping used in the straight leg of the steam generator and how the effects of void fraction are addressed.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating the impact of fluidelastic excitation on steam generator tube integrity.

(b) Westinghouse can sell support and defense of the thermal hydraulic analysis of secondary side flow field in the steam generator shell.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: CONO-13-22

CAW-13-3659

March 15, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-13-27 P-Attachment, "San Onofre Nuclear Generating Unit 2 MHI Replacement Steam Generator Reponses to RAIs 48 and 49" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3659 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern California Edison.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3659 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-13-3659

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 15th day of March 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGDA-13-27 P-Attachment, "San Onofre Nuclear Generating Unit 2 MHI Replacement Steam Generator Reponses to RAIs 48 and 49," dated March 14, 2013, for submittal to the Commission, being transmitted by Southern California Edison Letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the calculation of fluidelastic excitation of steam generator tubes and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information regarding the Westinghouse damping correlation and specifically how it relates to regions in the steam generator with high void fractions.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating the impact of fluidelastic excitation on steam generator tube integrity.

(b) Westinghouse can sell support and defense of the thermal hydraulic analysis of secondary side flow field in the steam generator shell.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: CONO-13-22

CAW-13-3660

March 15, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-13-23 P-Attachment, "San Onofre Nuclear Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 51" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3660 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern California Edison.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3660 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-13-3660

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 15th day of March 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGDA-13-23 P-Attachment, "San Onofre Nuclear Generating Unit 2 MHI Replacement Steam Generator Response to RAI 51," dated March 14, 2013, for submittal to the Commission, being transmitted by Southern California Edison Letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the calculation of fluidelastic excitation of steam generator tubes and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Respond to Nuclear Regulatory Commission (NRC) Request for Additional Information on intermediate details of the Westinghouse flow induced vibration (FIV) calculations for several limiting tubes. The information provided will enable the NRC to perform a comparison between Westinghouse and Mitsubishi Heavy Metal Industries (MHI) FIV methods and results.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating the impact of fluidelastic excitation on steam generator tube integrity.

(b) Westinghouse can sell support and defense of the thermal hydraulic analysis of secondary side flow field in the steam generator shell.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Westinghouse Electric Company
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
Direct fax: (724) 720-0754
e-mail: greshaja@westinghouse.com
Proj letter: CONO-13-22

CAW-13-3661

March 15, 2013

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: LTR-SGDA-13-29 P-Attachment, "San Onofre Nuclear Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 52" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-13-3661 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Southern California Edison.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference CAW-13-3661 and should be addressed to James A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

James A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-13-3661

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared James A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

James A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 15th day of March 2013

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Anne M. Stegman, Notary Public
Unity Twp., Westmoreland County
My Commission Expires Aug. 7, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390, it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in LTR-SGDA-13-29 P-Attachment, "San Onofre Nuclear Generating Station Unit 2 MHI Replacement Steam Generator Response to RAI 52," dated March 14, 2013, for submittal to the Commission, being transmitted by Southern California Edison Letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the calculation of fluidelastic excitation of steam generator tubes and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Respond to a Nuclear Regulatory Commission (NRC) Request for Additional Information regarding the design basis and methodology that was used by Westinghouse to evaluate the tube/anti-vibration bar (AVB) wear potential for steam generators in another plant that are most comparable to the replacement steam generators in San Onofre Nuclear Generating Station (SONGS) Unit 2.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of similar information to its customers for the purpose of evaluating the impact of fluidelastic excitation on steam generator tube integrity.

(b) Westinghouse can sell support and defense of the thermal hydraulic analysis of secondary side flow field in the steam generator shell.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for additional information regarding stability ratios calculated for certain anti-vibration bar (AVB) support conditions for the San Onofre Nuclear Generating Station Unit 2 steam generators.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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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 RAIs 46-49, 51 and 52

(NON-PROPRIETARY)

RAI 46:

In Reference 7, p. 15 of 131, please provide justification for selection of β=5.0 for the threshold value of the fluid elastic instability constant, and explain why it is a conservative selection for this application, considering the T/H conditions and size of the SONGS replacement SGs.

RESPONSE:

Note: Request for Additional Information (RAI) Reference 7 is the "Operational Assessment of Wear Indications In the U-Bend Region of San Onofre Unit 2 Replacement Steam Generators," WEC, Report No. SG-SGMP-12-10, Revision 3, October 2012.

Bases and Justification for Selection of β =5.0 for Threshold Instability Constant for SONGS:

Figure 1 shows the final results from WEC Reference 3 [

.]

SONGS steam generators have a smaller p/d ratio than the reference tests, so a scale factor based on available open literature and WEC proprietary tests was developed as shown on Figure 2. [

]

In summary, the value of β selected for use in the analysis is a lower bound value that envelops responses at frequencies both lower and higher than the minimum value at about [ ] as shown on Figure 1. Since the SONGS steam generators have relatively large regions with very high void fractions, the U-bend tests conducted in air are applicable to the thermal-hydraulic conditions present in the SONGS steam generators.

WEC References for RAI 46:

1.) SG-SGMP-12-10, Revision 3, "Operational Assessment of Wear Indications in the U-bend Region of San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators," October 2012.

2.) Westinghouse Letter LTR-SGDA-12-36, Revision 3, "Flow-Induced Vibration and Tube Wear Analysis of the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart," February 2013

3.) Westinghouse Document, 98-7TK0-TRIWK-R1, "Investigation of the Fluidelastic Vibration of U-Bend Tubes in a Triangular Pattern," September 1998, (originally provided via Preliminary Report 91-7TL3-TRIWK-R1, January 1991, for inclusion as Appendix B1 in Reference 4). [Proprietary]

Note that RAI Reference 7 and WEC Reference 1 are the same document.

Figure 1 Threshold Instability Constants Obtained from WEC Wind Tunnel Tests for Various Tube/AVB Support Conditions in 1/4 Scale U-bend Tests for Triangular Array Pattern (Pitch/Diameter = 1.42 with Typical Straight-Leg Length Indexing)

Figure 2 Effect of Pitch-to-Diameter Ratio on Fluidelastic Instability Threshold Constant in Triangular Array Pattern Steam Generators

RAI 47

In Reference 8, p. 87, Section 4.2.3, please explain how [

] **[Proprietary]**

RESPONSE:

Note: RAI Reference 8 is "Flow-Induced Vibration and Tube Wear Analysis of the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart," WEC, Report No. SG-SGDA-12-36, Revision 3, February 2013.

[ ]

The straight leg damping correlation was not used in the U-bend Flow Induced Vibration (FIV) response. The damping correlation provided in Section 4.2.3 of RAI Reference 8 is applicable to active modes in the straight leg and is a function of frequency, but not void fraction.

[

]

The U-bend damping correlation provided in Section 4.2.4 of RAI Reference 8 is applicable to active modes in the U-bend and upper portion of the straight leg and as can be seen below is a function of both frequency and void fraction:

The straight leg damping correlation was not used in the calculation of the FIV response of U-bend modes. The U-bend damping correlation that was used is a function of both frequency and void fraction, not just frequency. The effects of low damping due to high void fraction in the top portion of the straight leg is accounted for through calculation of the full tube modal effective void fraction including both the U-bend and straight leg portions of the tube.

RAI 48:

In Reference 8, p.88, Section 4.2.4, please provide information to demonstrate that the [

][Proprietary]

RAI 49:

In Reference 8, p. 95, Figure 4-3 is provided for [

] [Proprietary]

RESPONSE:

Note: RAI Reference 8 is "Flow-Induced Vibration and Tube Wear Analysis of the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart," WEC, Report No. SG-SGDA-12-36, Revision 3, February 2013.

Demonstration that U-bend Damping Correlations are Appropriate for Very High-Void Conditions:

WEC Reference 1 provides an open literature overview of steam-water tests conducted by MHI at temperatures up to 522°F and pressures up to 840 psi. WEC Reference 2 describes additional steam-water tests conducted by MHI for conditions up to 540°F and 1015 psi. WEC References 3 and 4 explain how damping data from those tests were evaluated, along with earlier data from a larger bundle, as a function of slip void fraction and frequency to obtain design correlations for damping in the U-bend region of steam generators. The resulting correlations that were cited in RAI Reference 8 have been successfully used in WEC designed steam generators since the correlations were developed. They were derived using data that covered the [ ] range in slip void fraction from test programs as described in WEC Reference 4.

The raw data used in the WEC Reference 3 and Reference 4 analyses for pinned supports were documented in proprietary technical exchange meetings between WEC and MHI in September 1986 and November 1987. [

]

The lower limit of damping recommended in WEC Reference 4 was a mathematical convenience that did not affect prior applications. [

] An additional study documented in WEC

Reference 5 used all the mechanical damping tests results from Section 8.0 of WEC Reference 4 to derive physically meaningful lower bounds. [

] Figure 2 taken from WEC Reference 5 illustrates the results of the final correlations for various pinned support conditions considered applicable in a pure steam environment with slip void fraction of 1.0.

[

]

Plots of U-bend Damping Correlations as a Function of Frequency and Void Fraction:

Figure 4 illustrates requested damping trends as a function of frequency for various void fractions between [ ] This plot represents results of the RAI Reference 8 WEC correlation for damping with pinned supports consistent with the two-phase steam environment of SONGS replacement steam generators (RSGs). [

] RAI Reference 8 analyses consistently used this option as most representative of current conditions in the steam generators and therefore most applicable to future projections of tube wear.

The damping correlation is a straight-forward explicit function of frequency and void fraction. However, each of those input values are modal effective characterizations of which part of the tube is moving and how much it is moving in the flow. [

]

[

] This option is used for evaluation of design adequacy in WEC analyses, but the Figure 4 option is considered most representative of field conditions in the SONGS steam generators. It is important to note that at 70% power, very high-void conditions where two-phase damping would be expected to approach nil do not exist in the SONGS steam generators.

Note: [1] [

]

WEC References for RAIs 48 and 49

1.) T. Nakamura, K. Fujita, K. Kawanishi, N. Yamaguchi, and A. Tsuge, "Study on the Vibrational Characteristics of a Tube Array Caused by Two-Phase Flow, Part 1, Random Vibration," Flow-Induced Vibration and Wear, ASME PVP Vol. 206, June 1991, pp. 19-24.

2.) T. Nakamura, K. Fujita, K. Kawanishi, N. Yamaguchi, and A. Tsuge, "Study on the Vibrational Characteristics of a Tube Array Caused by Two-Phase Flow, Part 2, Fluidelastic Vibration," Flow-Induced Vibration and Wear, ASME PVP Vol. 206, June 1991, pp. 25-30.

3.) Westinghouse Calculation Note, SM-92-24, Rev. 0, "Development of Damping Models for Tsuruga U-Bend Evaluations," March 20, 1992. [Proprietary]

4.) Westinghouse Document, WCAP-13264, "Steam Generator Tube Integrity Study for the Japan Atomic Power Company Summary Report," "Section 7.1 Development of Damping for Tube U-bend Evaluations," and "Section 8.0 Task F – Mechanical Damping Tests," March 1992. [Proprietary]

5.) Westinghouse Calculation Note, CN-NEE-00-0023, "Minimum Damping for Evaluation of U-bend Tubing with Pinned Intersections," March 2000. [Proprietary]

Figure 1 U-bend Damping for Pinned Intersections for High Void Fraction Data from WEC References 1, and 2 for Frequencies Near 30 Hz Together with Correlation Trend

Figure 2 U-bend Damping for Pinned Intersections as a Function of Frequency for Upper Limit Slip Void Fraction Value of 1.0 for Various Pinned Support Conditions that Correspond to the Various Values for Parameter A in the Inset Correlation (Figure 7 from WEC Reference 5)

Figure 3 U-bend Damping for Pinned Intersections as a Function of Frequency for Lower Limit Slip Void Fraction Value of 0.80 for Various Pinned Support Conditions that Correspond to the Various Values for Parameter A in the Inset Correlation (Figure 8 from WEC Reference 5)

Figure 4 U-bend Damping for Pinned Intersections as a Function of Frequency for Various Void Fractions as Applied for SONGS Evaluation in RAI Reference 8 (Pinned Supports with Gaps are Assumed Consistent with ECT Indications of Tube/AVB Wear)

Figure 5 U-bend Damping for Pinned Intersections as a Function of Frequency for Various Void Fractions (Pinned Supports with Small Preloads are Assumed for Estimate of Design Implications

RAI 51

In Reference 8, p. 101, in order for NRC staff to better understand the Westinghouse methodology and overall results, please provide a summary of analytic results that includes a breakdown of [

][Proprietary]

RESPONSE:

Note: RAI Reference 8 is "Flow-Induced Vibration and Tube Wear Analysis of the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart," WEC, Report No. SG-SGDA-12-36, Revision 3, February 2013.

The WEC method for calculating fluid elastic instability is similar in nature to the method used by MHI. However, some of the inputs and outputs used by the WEC method differ from the MHI method and therefore the tables providing the details of the stability ratio calculation differ. A summary of the differences in the inputs and outputs is explained in paragraphs (1) through (4) below.

(1) Damping Ratio Calculation:

The method of calculating the damping ratio differs between the WEC and MHI methods. [

] Additional information on the WEC damping correlation is provided as a response to RAIs 48 and 49.

(2) Application of the Conners Coefficient:

The second difference between the WEC and MHI method is the application of the Connors coefficient. [

]

Details of the derivation of the Connors coefficient are described in Section 4.2.5.2 of RAI Reference 8. Additional information on the WEC derivation of the Connors coefficient is contained in the response to RAI 46.

(3) Secondary Reference Densitiy (ρ_0):

A third difference between the WEC and MHI methodology is in the use of the secondary reference density ρ_0. This term appears in both the critical velocity and effective velocity calculation. In the final stability ratio calculation, the secondary reference density is divided out

of the equation so the differences in methodology have no impact on the stability ratio result. The MHI method uses an average secondary density that is calculated for each tube; whereas, the WEC methodology uses a constant value of [ ] This accounts for differences in the results when comparing the MHI calculated critical velocity or effective velocity to the WEC counterpart. It should be noted that the actual density of the tube and surrounding fluid is included in the integration of the effective velocity as it changes around the tube and the secondary reference density only applies to the constant density term in the critical and effective velocity equations.

(4) Average Void Fraction:

The average void fraction, as referenced in the MHI report, [

] Therefore, this value is not provided.

The details of the stability ratio calculation are provided for 10 limiting tubes in the out-of-plane direction in Table 1 and the in-plane direction in Table 2. Five of the tubes were chosen to be the limiting active tubes and the other five were chosen to be tubes plugged with a split cable stabilizer. The tubes provided in Table 1 and Table 2 were chosen from the subset of limiting tubes to provide a range of tube rows and support cases. The results for the tubes that contain a stabilizer include the added mass and additional damping provided by the split cable stabilizers. Details of the methodology used to model the split cable stabilizers are documented in Appendix C of RAI Reference 8. The detailed results in Table 1 and Table 2 were provided for the 70% power level.

Table 1 – Out-of-Plane Excitation Ratio Calculation Details

Tube		SG	Case	Tube Status	Mode	Tube Natural Frequency (Hz)	Damping Ratio	Connors coefficient (Beta)	Reference Fluid Density (lb/ft3)	Maximum Void Fraction	Critical Velocity (ft/s)	Effective Velocity (ft/s)	Excitation Ratio
Row	Col												

Table 2 – In-Plane Stability Ratio Calculation Details

Tube		SG	Case	Tube Status	Mode	Tube Natural Frequency (Hz)	Damping Ratio	Connors coefficient (Beta)	Reference Fluid Density (lb/ft3)	Maximum Void Fraction	Critical Velocity (ft/s)	Effective Velocity (ft/s)	Stability Ratio
Row	Col												

RAI 52:

In Reference 8, p. 254, Section 7.2.2.1, [

] [Proprietary]

Response:

Note: RAI Reference 8 is "Flow-Induced Vibration and Tube Wear Analysis of the San Onofre Nuclear Generating Station Unit 2 Replacement Steam Generators Supporting Restart," WEC, Report No. SG-SGDA-12-36, Revision 3, February 2013.

[ ]

[ ]

Explanation of Differences in Wear Coefficients Between SONGS and Plant B:

The variables (including wear coefficients) that were used in Plant B wear calculations were adjusted as necessary to obtain the observed depths and distributions found by eddy current testing (ECT) (bobbin) examinations.

Plant B wear coefficients are not directly comparable to SONGS wear coefficients. The wear coefficients used in the Plant B calculations were used to project for a typical design calculation and were not used to match observed wear depth. The objectives of the SONGS wear calculations were to match the known wear depths and then project future wear.

BOARD NOTIFICATION ENCLOSURE 7

SOUTHERN CALIFORNIA EDISON®
An *EDISON INTERNATIONAL*® Company

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

March 15, 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 54)
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. Email from Mr. James R. Hall (USNRC) to Mr. Ryan Treadway (SCE), dated February 21, 2013, Request for Additional Information (RAIs 53-67) Regarding Response to Confirmatory Action Letter, San Onofre Nuclear Generating Station, Unit 2

Dear Sir or Madam,

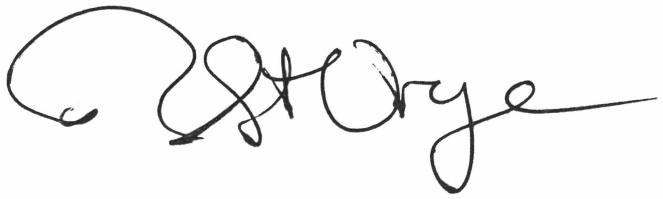
On March 27, 2012, the Nuclear Regulatory Commission (NRC) issued a Confirmatory Action Letter (CAL) (Reference 1) to Southern California Edison (SCE) describing actions that the NRC and SCE agreed would be completed to address issues identified in the steam generator tubes of San Onofre Nuclear Generating 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 email dated February 21, 2013 (Reference 3), the NRC issued Requests for Additional Information (RAIs) regarding the CAL response. Enclosure 1 of this letter provides the response to RAI 54.

P.O. Box 128
San Clemente, CA 92672

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,



Enclosure:

1. Response to RAI 54

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

ENCLOSURE 1

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 54

RAI 54

In Reference 1, Figures 4-11 and 4-13, the maximum depths in Figure 4-11 have been divided by the Unit 3 cycle length of 0.926 years to yield the growth rates in Figure 4-13. The staff understands that Figure 4-13 should be simply a scaled version of Figure 4-11. Please explain why some of the data in Figure 4-11 are not shown in Figure 4-13; for example, the three flaws shown in Figure 4-11 with maximum depths ranging from 89 to 100% (AREVA resized).

RESPONSE

RAI Reference 1 is the Operational Assessment for SONGS Unit 2 Steam Generators for Upper Bundle Tube-to-Tube Wear Degradation at End of Cycle 16," prepared by Intertek APTECH for Areva, Report No. AES 12068150-2Q-1, Revision 0, September 2012.

The wear rates shown in Figure 4-13 were computed by dividing the tube-to-tube wear (TTW) maximum depths by the operating cycle length. The Staff is correct to state that Figure 4-13 is simply a scaled version of Figure 4-11 in RAI Reference 1. A few data points for corresponding wear rates fell above the 100% through wall (TW) per years at power. Figure 4-13 has a vertical axis range of zero to 100% TW per years at power so these points are not seen. Attached are the same graphs in Figure 4-13 with the wear rate axis extended to 120% TW per years at power. The three data points mentioned in the RAI are now visible.

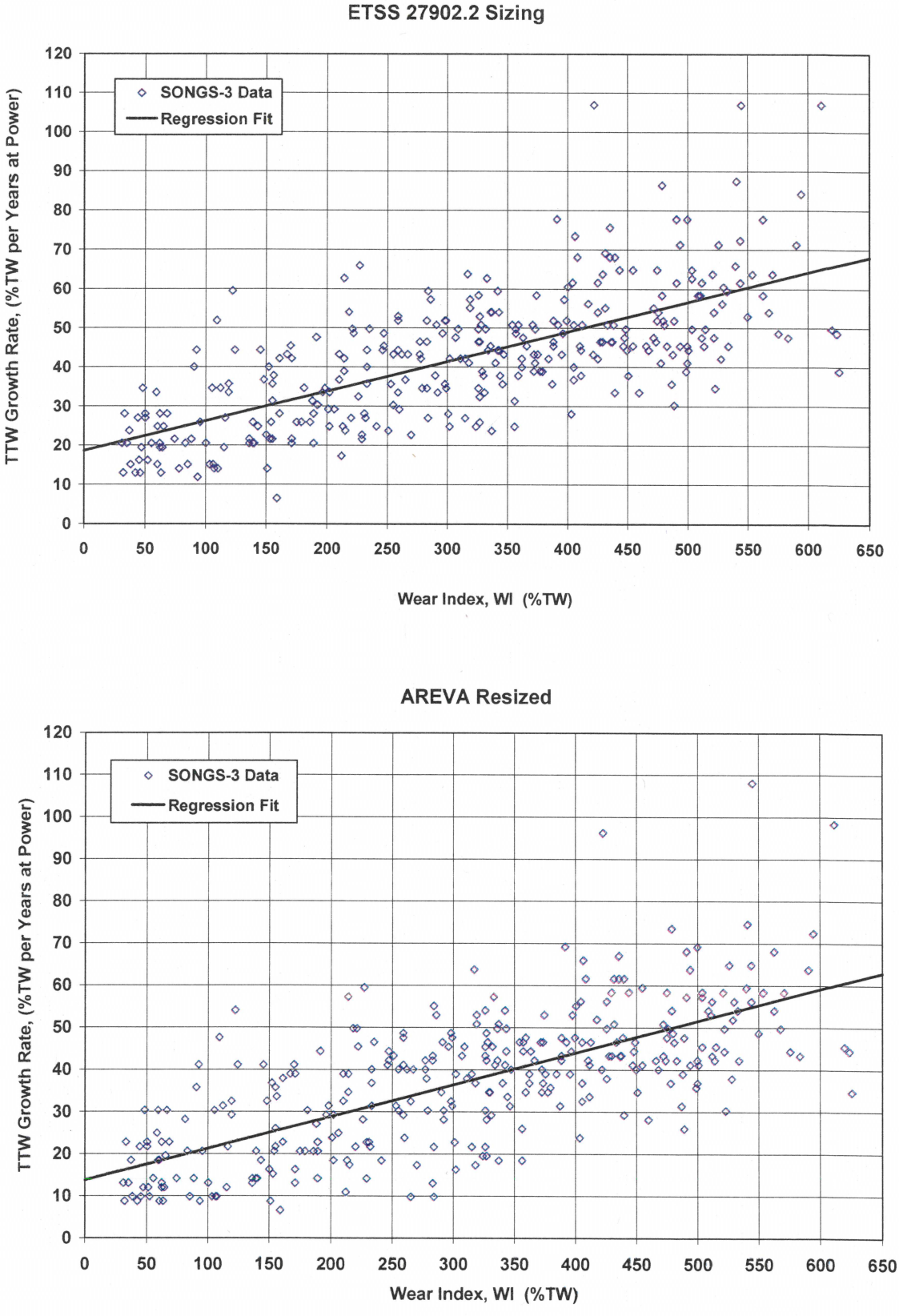


Figure 4-13 – Tube-to-Tube Wear Rate as a Function of Wear Index