UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 EAST LAMAR BLVD
ARLINGTON, TEXAS 76011-4511

December 23, 2013

EA-13-083

Mr. Tom Palmisano
Senior Vice President and
Chief Nuclear Officer
Southern California Edison Company
San Onofre Nuclear Generating Station
P.O. Box 128
San Clemente, CA 92674-0128

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION – FINAL SIGNIFICANCE DETERMINATION OF WHITE FINDING AND NOTICE OF VIOLATION, NRC INSPECTION REPORT 05000361/2012009 AND 05000362/2012009

Dear Mr. Palmisano:

This letter provides you the final results of our significance determination of the preliminary White finding identified in NRC Inspection Report 05000361/ 2012009; 05000362/ 2012009 (NRC's Agencywide Documents Access and Management System (ADAMS) Accession ML13263A271) dated September 20, 2013. The finding involved the failure to verify the adequacy of the thermal-hydraulic and flow-induced vibration design of the Unit 3 replacement steam generators, which resulted in significant and unexpected steam generator tube wear and the loss of tube integrity on Unit 3 Steam Generator 3EO-88 after 11 months of operation.

In a letter dated October 21, 2013, (ML13296A018), you provided a response to the NRC staff's preliminary determination regarding this finding. Your response included your agreement that the finding has low-to-moderate safety significance and is, therefore, appropriately characterized as a White finding. After considering the information developed during the inspection and the additional information you provided in your letter, the NRC has concluded that the finding is appropriately characterized as White, a finding of low to moderate safety significance.

You have 30 calendar days from the date of this letter to appeal the staff's determination of significance for the identified White finding. Such appeals will be considered to have merit only if they meet the criteria given in the IMC 0609, Attachment 2. If you choose to appeal, you must send your appeal to the Regional Administrator, Region IV, 1600 East Lamar Blvd., Arlington, Texas 76011-4511.

The NRC has also determined that the failure to verify the adequacy of the thermal-hydraulic and flow-induced vibration design of the Unit 3 replacement steam generators is a violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," with an associated violation of

Technical Specification 5.5.2.11, “Steam Generator Program.” The circumstances surrounding the violation were described in detail in NRC Inspection Report 05000361/2012009 and 05000362/2012009. In accordance with the NRC Enforcement Policy, this violation is considered an escalated enforcement action because it is associated with a White finding.

The NRC has concluded that the information regarding the reason for the violation is already adequately addressed on the docket through detailed inspection reports and your response letter dated October 21, 2013. Additional information regarding the reason for the violation is not required, unless the description therein does not accurately reflect the reasons for the violation or your position. However, you are required to respond to this letter and provide the results of your evaluation of the extent of condition related to the reasons for the violation.

Specifically, if you determine that any reason for this violation may apply to work activities during decommissioning and dry cask storage, including oversight of contractor activities, then for each such reason, your reply should include: (1) the corrective steps that have been taken and the results achieved, (2) the corrective steps that will be taken, and (3) the date when all associated corrective actions will have been implemented. If you determine that no reason for this violation could reasonably apply to decommissioning or dry cask storage activities, then your reply should include a statement to that effect. You should follow the instructions specified in the enclosed Notice when preparing your response.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from ADAMS, accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction.

Sincerely,

/RA/

Marc L. Dapas
Regional Administrator

Dockets: 50-361, 50-362
Licenses: NPF-10, NPF-15

Enclosure: Notice of Violation

cc w/encl:
Electronic Distribution for San Onofre
Nuclear Generating Station

cc: Distribution for San Onofre Nuclear Generating Station

RidsOeMailCenter Resource;
RidsSecyMailCenter Resource;
RidsEdoMailCenter Resource;
RidsOiMailCenter Resource;
RidsRgn2MailCenter Resource;
RidsNrrDirsEnforcement Resource
Marc.Dapas@nrc.gov;
Roy.Zimmerman@nrc.gov;
Tom.Blount@nrc.gov;
Jeff.Clark@nrc.gov;
Heather.Gepford@nrc.gov;
Christi.Maier@nrc.gov;
Marisa.Herrera@nrc.gov;
R4Enforcement;
Greg.Warnick@nrc.gov;
Brett.Rini@nrc.gov

OEWEB Resource;
RidsOcaMailCenter Resource;
EDO_Managers
RidsRgn1MailCenter Resource;
RidsRgn3MailCenter Resource;
RidsOpaMail Resource;
Steven.Reynolds@nrc.gov;
Bill.Maier@nrc.gov;
Kriss.Kennedy@nrc.gov;
Troy.Pruett@nrc.gov;
Rachel.Browder@nrc.gov;
Victor.Dricks@nrc.gov;
Lara.Uselding@nrc.gov;
Ryan.Lantz@nrc.gov;
Carleen.Sanders@nrc.gov;

RidsOgcMailCenter Resource;
RidsOigMailCenter Resource;
RidsOcfoMailCenter Resource;
NRREnforcement.Resource

Karla.Fuller@nrc.gov;
Nick.Hilton@nrc.gov;
John.Wray@nrc.gov;
Robert.Carpenter@nrc.gov;
Gerald.Gulla@nrc.gov;
Greg.Werner@nrc.gov;
Bob.Hagar@nrc.gov;
Blair.Spitzberg@nrc.gov;
Dori.Willis@nrc.gov;

S:\RAS\ACES\ENFORCEMENT_EA CASES - OPEN\SONGS_EA-13-083_SG Tube Integrity White Finding\Final Action\FINAL WHITE_EA-13-083_SONGS_12-13-13.docx

ADAMS	☐ No	☒ Yes	☒SUNSI Review Complete	Reviewer Initials: RSB
☒ Publicly Available		☐Non-publicly Available	☐Sensitive	☒ Non-sensitive
Category:		**KEYWORD**: **EA-13-083**		

RIV:	BC	BC	SES:ACES	RC
BHagar	GWerner	RLantz	RSBrowder	KSFuller
/RA/	***/RA/***	***/RA/***	***/RA/***	***/RA/***
12/11/13	12/11/13	12/10/13	12/10/13	12/11/13
C:ACES/ORA	OE	D:DRP	DRA	RA
HJGepford	RCarpenter	KKennedy	SReynolds	MLDapas
/RA/	***/RA/***	***/RA/***	***N/A***	***/RA/***
12/12/13	12/12/13	12/16/13		12/23/13

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

NOTICE OF VIOLATION

Southern California Edison
San Onofre Nuclear Generating Station

Docket No. 50-362
License No. NPF-15
EA-13-083

During an NRC inspection conducted on December 3, 2012, through June 7, 2013, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Technical Specification 5.5.2.11, "Steam Generator Program," Section b, "Performance criteria for SG [steam generator] tube integrity," states, in part, that steam generator tube integrity shall be maintained by meeting the performance criteria for tube structural integrity and accident induced leakage.

Technical Specification 5.5.2.11 b.1, "Structural integrity performance criterion," states, in part, that all in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions, to include retaining a safety factor of 3.0 against burst under normal steady state full power operation primary-to-secondary differential pressure.

Technical Specification 5.5.2.11 b.2, "Accident induced leakage performance criterion," states, in part, that leakage shall not exceed 0.5 gallons per minute per steam generator for a main steam line break accident.

Contrary to the above, design control measures were not established to provide for verifying or checking the adequacy of certain designs. Specifically, on January 28 and April 2, 2008, the licensee's design control measures did not provide for verifying or checking the adequacy of design Documents L5-04GA504 (SO23-617- 1-C157), "Evaluation of Tube Vibration," Revision 3, and L5-04GA521 (SO23-617-1- C683), "Three-Dimensional Thermal and Hydraulic Analysis," Revision 3, developed by Mitsubishi, for the flow-induced vibration and thermal-hydraulic designs. As a result, the licensee did not verify or check the output of the thermal-hydraulic code and input to the vibration code to be in accordance with ASME Section III, Appendix N, "Dynamic Analysis Methods."

Consequently, the inadequate thermal-hydraulic and flow-induced vibration design resulted in non-conservative flow conditions, which led to fluid-elastic instability of a group of tubes in the Unit 3 replacement steam generators. This resulted in one tube leaking, which prompted the licensee to shut down the plant on January 31, 2012. In March 2012, in-situ pressure testing on Unit 3 steam generator 3EO-88 revealed that eight tubes had failed to meet the performance criteria for structural integrity and

accident induced leakage. Specifically, during in-situ pressure testing, tubes R106C78, R102C78, R104C78, R100C80, R107C77, R101C81, R98C80, and R99C81 in steam generator 3EO-88 failed to meet the structural integrity criterion limit of three times the normal steady state primary-to-secondary differential pressure of 5250 psig, with the tubes failing at test pressures ranging from 2874 psig to 5026 psig. In addition, tubes R106C78, R102C78, and R104C78 failed to meet the accident-induced leakage criterion of not exceeding 0.5 gpm leakage per steam generator at a main steam line break pressure of 3200 psig, with each tube having leakage rates of approximately 4.5 gpm, prior to exceeding 3200 psig.

This violation is associated with a White Significance Determination Process finding.

Pursuant to the provisions of 10 CFR 2.201, Southern California Edison Company is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region IV, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA 13-083." The reply should include a written explanation for the evaluated extent of conditions. Particularly, if you determine that any reason for this violation may apply to work activities during decommissioning and dry cask storage, including oversight of contractor activities, then for each such reason, your reply should include: (1) the corrective steps that have been taken and the results achieved, (2) the corrective steps that will be taken, and (3) the date when all associated corrective actions will have been implemented. If you determine that no reason for this violation could reasonably apply to decommissioning or dry cask storage activities, then your reply should include a statement to that effect.

Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information.

If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated this 23rd day of December 2013