UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 25, 2009

LICENSEE: SOUTHERN CALIFORNIA EDISON COMPANY

FACILITY: SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3

SUBJECT: SUMMARY OF SEPTEMBER 15, 2009, MEETING WITH SOUTHERN CALIFORNIA EDISON COMPANY ON WELD DEFECTS FOUND IN THE REPLACEMENT STEAM GENERATORS INTENDED FOR FUTURE USE AT SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3

On September 15, 2009, a public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Southern California Edison Company (SCE) at NRC Headquarters, Executive Boulevard Building, in Rockville, Maryland. SCE requested the meeting to brief the NRC staff about weld defects discovered in replacement steam generators (RSGs) being fabricated for the San Onofre Nuclear Generating Station (SONGS), Unit 3, by Mitsubishi Heavy Industries (MHI) in Kobe, Japan. The meeting was initially noticed on September 2, 2009, and the notice was re-issued on September 9, 2009, to revise the starting time. The list of meeting participants is enclosed. SCE's presentation slides are available through the NRC's Agencywide Documents Access and Management System (ADAMS), at ADAMS Accession No. ML092590470.

SCE's presentation focused on the evaluation of the divider plate weld separation and cracking found in the Unit 3 RSGs during inspections at MHI's fabrication facility. SCE also discussed its plans for repair for the Unit 3 RSGs, and its assessment of the acceptability of the Unit 2 RSGs, which are to be installed during the upcoming refueling outage beginning on September 27, 2009.

SCE described the design of the RSGs and the divider plate-to-channel head weld. The channel head is made of a low alloy steel, with a layer of stainless steel cladding applied on the interior surface to inhibit corrosion. To ensure a strong weld joint between the Alloy 690 divider plate and the channel head, the stainless steel cladding is removed below the area of the divider plate and replaced with Alloy 152 weld material. The weld joint is then completed with the application of the Alloy 152 weld material along the length of the divider plate. MHI conducted hydrostatic pressure tests on the Unit 3 RSGs following fabrication, and identified cracking and strain marks in the divider plate-to-channel head welds for both the 3A and 3B RSGs, through post-test visual inspections and liquid penetrant examinations. Additional ultrasonic exams were performed that indicated separation of the weld material and cladding from the channel head base metal in the vicinity of the welds.

SCE and MHI brought in a team of outside experts in the areas of welding, non-destructive examination, and metallurgy to assist in the root cause investigation. Material samples were taken from the RSGs and analyzed, and fabrication conditions were modeled using mock-ups to determine potential causes for the defects. Through these tests and analyses, SCE and MHI determined that the air carbon-arc gouging technique used to remove the stainless steel clad material below the divider plate resulted in higher carbon content and areas of higher hardness in the vicinity of the weld joint. These regions of higher hardness and variations in surface conditions led to weak weld bonding and weld joints of less than design strength, resulting in the observed cracking and separation in the affected welds. SCE also stated that hydrogen induced cracking could not be ruled out as a contributing factor, as the higher material hardness and steeper weld joint edge resulting from the arc gouging technique may have made the welds more susceptible to that phenomenon.

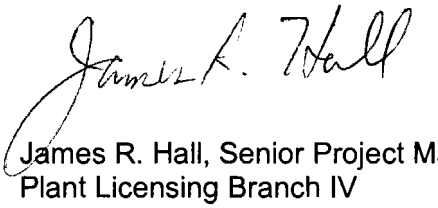
SCE described the repair plan for the Unit 3 RSGs. SCE and MHI performed additional stress analysis and visual, penetrant, and ultrasonic examinations to confirm the acceptability of the undamaged Unit 3 RSG components, including the divider plate, for reuse. SCE noted that the repair plan is still undergoing review and revision, but will rely on the manual grinding technique used for the Unit 2 RSGs. The repair process will also incorporate controls to minimize the introduction of hydrogen and reduce stresses in the weld joint.

SCE discussed its assessment of the condition of the Unit 2 RSGs, which were fabricated, tested, shipped and received at the SONGS site before the Unit 3 RSG weld defects were identified. SCE performed additional visual, penetrant and ultrasonic examinations of the Unit 2 RSGs, to the same standards applied to the Unit 3 RSGs in the root cause evaluation, and found no evidence of cracking or separation of the subject welds in the Unit 2 RSGs. SCE intends to proceed with installation of the Unit 2 RSGs, based on the results of the initial and additional weld examinations, and the root cause determination that the air carbon-arc gouging process, used for the Unit 3 but not the Unit 2 RSGs, caused the defective welds.

SCE closed the presentation with a commitment to perform additional confirmatory inspections of the divider plate welds following the installation of the RSGs for both units. These will consist of remote visual and ultrasonic inspections of the accessible areas performed during the first steam generator inspection outage and the outage near the end of the first 10-year interval for the RSGs for each unit. These commitments will be documented in a letter to the NRC.

A member from the office of Representative Darrell Issa (R-California) attended the meeting, and a staff member from the California Energy Commission participated by telephone. No members of the public were in attendance. No Public Meeting Feedback forms were submitted for this meeting.

The NRC staff thanked SCE for the presentation and acknowledged receipt of the formal root cause evaluation report, dated September 11, 2009. A non-proprietary version of the report is available at ADAMS Accession No. ML092600514. Please direct any inquiries to me at 301-415-4032 or Randy.Hall@nrc.gov.



James R. Hall, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-361 and 50-362

Enclosure:
List of Attendees

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LIST OF ATTENDEES
SEPTEMBER 15, 2009, MEETING WITH SOUTHERN CALIFORNIA EDISON (SCE)
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3
REPLACEMENT STEAM GENERATOR WELD DEFECTS

NAME	AFFILIATION
Simon Sheng	NRC/NRR//DCI
Michael Markley	NRC/NRR//DORL
Randy Hall	NRC/NRR/DORL
Nicholas DiFrancesco	NRC/NRR/DORL
Greg Makar	NRC/NRO/DE
Kerri Kavanagh	NRC/NRO/DCIP
Ken Karwoski	NRC/NRR/DCI
Patrick Purtscher	NRC/NRR/DCI
Charles Harris	NRC/RES/DE
Amy Powell	NRC/OCA
Robert Pettis	NRC/NRR/DE
Matt Young*	NRC/RIV/DRS
Justin Fuller*	NRC/RII/DCI
Alain Artayet*	NRC/RII/DCI
John Ohly	Office of Representative Darrell Issa (R-California)
Barbara Byron*	California Energy Commission
A. E. Scherer	SCE
Gil Moegerle	SCE
Jaime Huff	SCE
Bill Kotteakos	SCE
Jeff Ellis	SCE
Michael A. Wharton	SCE
Richard St. Onge	SCE
Linda Conklin	SCE
Craig Harberts	SCE
Russ Cipolla	Aptech
Michael Short	NWI
Frank Gillespie	Mitsubishi Nuclear Energy Systems (MNES)
Ken-ichi Sonada	MNES
Yosshiro Aiura	MNES
Con Wilson	Mitsubishi Heavy Industries (MHI)
Masahiko Toyoda	MHI
Keita Kobayashi	MHI
Hitoshi Kaguchi	MHI
Steve Bennett	Entergy
Brian Matthew	Entergy

* Participated by telephone

Enclosure

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/ra/

James R. Hall, Senior Project Manager
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ADAMS Accession No. Meeting Notice ML092440095, Meeting Summary: ML092650772 , Handouts ML092590470

OFFICE	DORL/LPL4/PM	DORL/LPL4/LA	DCI/CVIB/BC	DORL/LPL4/BC	DORL/LPL4/PM
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DATE	9/23/09	9/23/09	9/24/09	9/25/09	9/25/09

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