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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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September 11, 1980

Docket No. 50-206

LICENSEE: Southern California Edison Company  
FACILITY: San Onofre Nuclear Generating Station Unit 1  
SUBJECT: SUMMARY OF AUGUST 15, 1980 MEETING TO DISCUSS STEAM GENERATOR  
INSPECTION AND REPAIR PROGRAM RESULTS TO DATE

*SEE Rpts #8010270391*

NRC and Southern California Edison (SCE) representatives met in Bethesda, Maryland, on August 15, 1980, to discuss the status and results of the steam generator inspection and repair program. The meeting attendees are listed in Enclosure 1.

This meeting was another in the series of meetings begun on July 22, 1980 that SCE has requested to discuss the program that would satisfy the licensing requirements for return to power following steam generator repair. At the August 15, 1980 meeting, SCE presented the results of their steam generator inspections, additional discussion of the decontamination of the steam generator bowl along with other ALARA activities, a description of the on going testing program related to the sleeving program, and details of the other efforts (e.g. tube plugging) associated with the three steam generators. The material presented (minus Westinghouse proprietary data) is provided in Enclosure 2.

The major issues discussed during the presentation are summarized below:

A. Inspection Program

SCE had completed their Eddy Current Testing (ECT) the week prior to the meeting and were making preparations to remove the testing equipment the week of August 18. As a result of the ECT, tube pulling, pressure tests, sludge mapping, and laboratory examinations, SCE had defined zones in each of the three steam generators that require sleeving. Their conclusions from the inspection program are that (1) sleeves are required in the hot side only, (2) intergranular attack (IGA) is no greater than approximately 20% in tubes in the periphery, (3) the maximum rate of IGA has been approximately 15% per year, (4) all tubes with crack indications of 50% or greater will be sleeved or plugged, (5) the rotating pancake coil probe can detect crack penetration of 50% or greater, (6) IGA is related to secondary water chemistry and the hard sludge pile that exists, and (7) the shape and size of the sludge pile is not expected to change significantly during future operation.

B. Decontamination and ALARA

A video tape that demonstrated the installation of the bladder seal used during decontamination of the steam generator bowl was viewed. SCE then discussed the precautions that would alleviate the problems encountered in July during the flushing of the steam generator bowl. The bladder seal was redesigned so that the disc would not rupture the bladder. In addition, because of the fixed amount of water in the decontamination system, the boron dilution from a ruptured seal would be no more than 50 parts per million (ppm) out of 3400 ppm, well within the Technical Specifications limit. Additional procedures beyond those that were used in July, will be in effect. These procedures require monitoring the pneumatic pressure on the bladder and halting the decontamination if the seal fails.

SCE discussed the NRC concerns of the use of magnetite and radiation levels in the steam generator bowls with resumed power operation. The hinged cover will be inserted deeper into the inlet pipe than it had been in the past. With the deeper insertion and the shape of the bowl, SCE estimates only 100-200 grams of magnetite could be expected to get into the primary system with seal failure. These small amounts of magnetite are expected to be removed through the reactor clean up system. SCE representatives also presented data to demonstrate from past experience that the radiation levels in the bowl would return to the pre-decontaminated level following resumed operation and therefore, decontamination would not have a long-term effect on ALARA.

SCE stated that they will be ready to decontaminate about September 1, 1980 and they expect the decontamination to take between 6 to 9 days. Besides the decontamination SCE plans to use extensive lead shielding to reduce levels to as low as reasonably achievable. To date the steam generator inspection and repair program has resulted in approximately 150 man-rems. SCE expects an additional 900 to 950 man-rems for the remaining efforts associated with the decontamination, sleeving and plugging tasks.

C. Testing Program

SCE described the test program in progress to verify the adequacy of the steam generator repair. Tests include proof pressure test, heatup and cooldown cycling, transient loading and unloading, loss of pressure, axial shear fatigue, heat sink effects on braze, and model boiler tests. The NRC was concerned that the heatup and cooldown tests would not be completed prior to restart of SONGS I and that the test did not include tubes that had been re-brazed. SCE assured the staff that the heatup and cooldown tests would be completed before startup but not prior to sleeving the steam generators and that the test will include re-brazing.

SCE discussed the non-destructive examination (NDE) techniques that will be used to inspect the steam generators after the repairs are made. Adequate examination techniques to verify the continued integrity of the braze joint after plant operation was an issue that SCE needs to address prior to plant restart.

SCE will sleeve three tubes in place the week following the meeting. The three sleeved tubes will be removed and examined to verify the success of the brazing process.

D. Steam Generator Repairs

SCE will use a combination of sleeving and plugging to repair the steam generator prior to restart. Repairs to the tubes will be in the defined zones of high IGA. Tubes outside of the zones are concluded to have no or low level of IGA. Approximately 200 to 300 tubes are enclosed in the zones of high IGA but are outside the area of the steam generator that can accept either the 30" or 36" sleeve. SCE will determine if these 200-300 tubes exhibit high IGA and, if they do, mechanical plugs will be installed. Mechanical plugs will be used in place of explosive plugs so that these tubes can be returned to service at a later time if a sleeving mechanism can be developed for this region of the steam generator.

SCE is using their existing plugging criteria, i.e., 50% crack penetration to define which tubes need to be sleeved or plugged. SCE is scheduled to start sleeving approximately September 15, 1980 and had planned to install plugs prior to decontamination. The NRC staff indicated that they want the opportunity to review the design of mechanical plug for acceptability. Because of the NRC interest, SCE will consider plugging after sleeving. SCE will provide a report discussing the mechanical plug for the NRC to review with their submittal. Since the plugging operation is performed more remotely than sleeving, SCE estimates that a 200 man-rem exposure savings will result by removing 200-300 tubes from the sleeving operation and plugging them instead.

SCE reported that the rolling of the sleeve would provide the primary seal and the braze joint would be a backup seal. Welding of the lower part of the sleeve is still under review and SCE may elect to braze the lower part as well as the upper part.

E. Future Actions

Since the next meeting had been scheduled for Labor Day SCE proposed to change the date to later during the week. Future discussion will include additional details of SCE's efforts with respect to ALARA and their proposed modifications to the secondary water chemistry control program to arrest the IGA. The NRC is also interested in obtaining additional information on the post-repair and post-startup inspection and monitoring program.

Stanley J. Nowicki, Project Manager  
Operating Reactors Branch #5

OFFICE	DL: <i>SN</i> #5	DL: <i>SN</i> #5	Division of Licensing		
SURNAME	SNowicki:cc	DCritchfield			
DATE	9/10/80	9/11/80			

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*Stanley J. Nowicki*

Stanley J. Nowicki, Project Manager  
Operating Reactors Branch #5  
Division of Licensing

## ATTENDANCE

August 15, 1980

1.	Stan Nowicki	NRC
2.	Blaine Curtis	SCE
3.	Stefan Pawlicki	NRC
4.	B. D. Liaw	NRC
5.	James Wing	NRC
6.	William Collins	NRC
7.	Richard Emch	NRC
8.	Frank Witt	NRC
9.	Paul Wu	NRC
10.	Carl Hirst	<u>W</u> NTD
11.	Russell Krieger	SCE
12.	Caius Dodd	O.R.N.L.
13.	Emmett Nurphy	NRC
14.	Bernard Turoulin	NRC
15.	D. Malinowski	<u>W</u> SOD
16.	TTimmons	<u>W</u> NTD
17.	W. Junker	<u>W</u> R&D
18.	Earl Morgan	<u>W</u> SOD
19.	W. Fletcher	<u>W</u> SOD
20.	E. Murphy	<u>W</u> BLO
21.	J. Rajan	NRC
22.	CHinson	NRC
23.	Peter DeRosa	<u>W</u> NSD
24.	Robert Akin	<u>W</u> NSD
25.	A.W. Klein	<u>W</u> SOD
26.	J. M. Grant	NRC
27.	Daniel Huang	NRC
28.	D. van Rooyen	Brookhaven Nat. Lab.
29.	Frank Almeter	NRC
30.	Y. S. Huang	NRC
31.	J. S. Creswell	NRC
32.	James Taylor	<u>W</u> NSD

Licensing Information Schedule

Preliminary Discussions w/NRC	6/18, 7/1, 7/10
Presentation of Program Plan	7/22
NRC Meeting to Discuss Sleeving	7/31
NRC Meeting to Update Info	8/15
NRC Mtg & Sleeving Report Including Zones to be Repaired	9/1
NRC Approval to Install Sleeves	9/10
Final Revised Reload Safety Evaluation Report	10/7
NRC Approval to Resume Operation	11/1