

August 26, 1998

Mr. Harold B. Ray  
Executive Vice President  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, California 92674-0128

SUBJECT: ISSUANCE OF AMENDMENT FOR SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 2 (TAC NO. M99641) AND UNIT NO. 3 (TAC NO. M99642)

Dear Mr. Ray:

The Commission has issued the enclosed Amendment No. 140 to Facility Operating License No. NPF-10 and Amendment No. 132 to Facility Operating License No. NPF-15 for San Onofre Nuclear Generating Station, Unit Nos. 2 and 3. The amendments consist of changes to the Technical Specifications (TS) in response to your application dated September 16, 1997, as supplemented by letter dated February 23, 1998.

These amendments would allow sleeving of steam generator tubes with sleeves designed by the vendor, ASEA Brown Boveri/Combustion Engineering (ABB/CE). Additionally, the proposed TS amendment would require that sleeves be removed from service upon detection of service-induced degradation, require post weld heat treatment (PWHT) of sleeve welds, and reduce the allowable primary to secondary leakage through any one steam generator to 150 gallons per day (gpd).

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly Federal Register notice.

Sincerely,  
Original Signed By  
James W. Clifford, Senior Project Manager  
Project Directorate IV-2  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

*Handwritten initials and signature*

Docket Nos. 50-361  
and 50-362

Enclosures: 1. Amendment No. 140 to NPF-10  
2. Amendment No. 132 to NPF-15  
3. Safety Evaluation

cc w/encls: See next page

DOCUMENT NAME: SO99641.AMD

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Mr. Harold B. Ray

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August 26, 1998

cc:

Mr. R. W. Krieger, Vice President  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P. O. Box 128  
San Clemente, California 92674-0128

Resident Inspector/San Onofre NPS  
c/o U.S. Nuclear Regulatory Commission  
Post Office Box 4329  
San Clemente, California 92674

Chairman, Board of Supervisors  
County of San Diego  
1600 Pacific Highway, Room 335  
San Diego, California 92101

Mayor  
City of San Clemente  
100 Avenida Presidio  
San Clemente, California 92672

Alan R. Watts, Esq.  
Woodruff, Spradlin & Smart  
701 S. Parker St. No. 7000  
Orange, California 92668-4702

Mr. Dwight E. Nunn, Vice President  
Southern California Edison Company  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, California 92674-0128

Mr. Sherwin Harris  
Resource Project Manager  
Public Utilities Department  
City of Riverside  
3900 Main Street  
Riverside, California 92522

Regional Administrator, Region IV  
U.S. Nuclear Regulatory Commission  
Harris Tower & Pavilion  
611 Ryan Plaza Drive, Suite 400  
Arlington, Texas 76011-8064

Mr. Paul Schneringer  
San Onofre Liaison  
San Diego Gas & Electric Company  
P.O. Box 1831  
San Diego, California 92112-4150

Mr. Steve Hsu  
Radiologic Health Branch  
State Department of Health Services  
Post Office Box 942732  
Sacramento, California 94234



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

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-361

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 140  
License No. NPF-10

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee) dated September 16, 1997, as supplemented by letter dated February 23, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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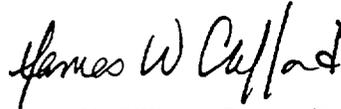
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Facility Operating License No. NPF-10 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 140 , are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and is to be implemented within 30 days of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



James W. Clifford, Senior Project Manager  
Project Directorate IV-2  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: August 26, 1998 .

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 140 TO FACILITY OPERATING LICENSE NO. NPF-10

DOCKET NO. 50-361

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by Amendment number and contain marginal lines indicating the areas of change.

REMOVE

3.4-37  
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3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.13 RCS Operational LEAKAGE

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:

- a. No pressure boundary LEAKAGE;
- b. 1 gpm unidentified LEAKAGE;
- c. 10 gpm identified LEAKAGE;

NOTE: With no SG sleeving installed, d. and e. apply.  
Following installation of any sleeving in any SG, d.  
and e. do not apply and f. does apply.

- d. 1 gpm total primary to secondary LEAKAGE through all steam generators (SGs); and
- e. 720 gallons per day (1/2 gpm) primary to secondary LEAKAGE through any one SG.
- f. With steam generator sleeving installed in any SG, 150 gallons per day primary to secondary LEAKAGE through any one SG.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCS LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE.	A.1 Reduce LEAKAGE to within limits.	4 hours
B. Required Action and associated Completion Time of Condition A not met.  <u>OR</u>  Pressure boundary LEAKAGE exists.	B.1 Be in MODE 3.	6 hours
	<u>AND</u> B.2 Be in MODE 5.	36 hours

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.8 Primary Coolant Sources Outside Containment Program (continued)

system (post-accident sampling return piping only). The program shall include the following:

- a. Preventive maintenance and periodic visual inspection requirements; and
- b. Integrated leak test requirements for each system at refueling cycle intervals or less.

### 5.5.2.9 Pre-Stressed Concrete Containment Tendon Surveillance Program

This program provides controls for monitoring any tendon degradation in pre-stressed concrete containment, including effectiveness of its corrosion protection medium, to ensure containment structural integrity. Program itself is relocated to the LCS.

### 5.5.2.10 Inservice Testing Program

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components including applicable supports. Program itself is relocated to the LCS.

### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program

This program provides controls for monitoring SG tube degradation. Each SG shall be demonstrated OPERABLE by meeting the requirements of Specification 5.5.2.11 and by meeting an augmented inservice inspection program based on a modification of Regulatory Guide 1.83, Revision 1, which includes at least the following:

#### a. SG Sample Selection and Inspection

Each SG shall be determined OPERABLE during shutdown by selecting and inspecting at least the minimum number of SG specified in Tables 5.5.2.11-1 and 5.5.2.11-2.

#### b. SG Tube Sample Selection and Inspection

The SG tube and sleeve minimum sample size, inspection result classification, and the corresponding action required shall be as specified in Tables 5.5.2.11-1 and 5.5.2.11-2. The inservice inspection of SG tubes and sleeves shall be performed at the frequencies specified in Specification 5.5.2.11.e and the inspected tubes shall be verified acceptable per the acceptance criteria of Specification 5.5.2.11.f. The tubes selected for each inservice inspection shall include at least 3% of the total

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

number of tubes in all SGs; the tubes selected for these inspections shall be selected on a random basis except:

1. Where experience in similar plants with similar water chemistry indicates critical areas to be inspected, then at least 50% of the tubes inspected shall be from the critical areas;
2. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each SG shall include:
  - a) All non-repaired tubes that previously had detectable wall penetrations (greater than 20%),
  - b) Tubes in those areas where experience has indicated potential problems, and
  - c) A tube inspection (pursuant to Specification 5.5.2.11.f) shall be performed on each selected tube. If any selected tube does not permit the passage of the eddy current probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection.
3. All sleeves shall be inspected with eddy current prior to initial operation. This includes pressure retaining portions of the parent tube in contact with the sleeve, the sleeve-to-tube weld and the pressure retaining portion of the sleeve.
4. Following the preservice inspection, 20% of sleeves that have been in service for a full cycle of operation shall be inspected. The sleeves shall be selected on a random basis. If indications of degradation are found in the sample the inspection sample shall be expanded. Table 5.5.2.11-2 contains the requirements for sample expansion.

(continued)

5.5 Procedures, Programs, and Manuals

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

c. Examination Results

The results of each sample inspection shall be classified into one of the following three categories:

- C-1 Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
- C-2 One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
- C-3 More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

This classification shall also apply to sample inspections of sleeves.

-----NOTE-----  
In all inspections, previously degraded non-repaired tubes must exhibit significant (greater than 10%) further wall penetrations to be included in the above percentage calculations.  
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d. Supplemental Sampling Requirements

The tubes selected as the second and third samples (if required by Table 5.5.2.11-1) may be subjected to a partial tube inspection provided:

- 1. The tubes selected for these samples include the tubes from those areas of the tube sheet array where tubes with imperfections were previously found, and
- 2. The inspections include those portions of the tubes where imperfections were previously found.

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

#### e. Inspection Frequency

The above required inservice inspections of the non-repaired SG tubes shall be performed at the following frequencies:

1. The first inservice inspection shall be performed after 6 effective full power months but within 24 calendar months of initial critically. Subsequent inservice inspections shall be performed at intervals of not less than 12 nor more than 24 calendar months after the previous inspection. If two consecutive inspections, not including the preservice inspection, result in all inspections results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months;
2. If the results of the inservice inspection of a SG conducted in accordance with Table 5.5.2.11-1 at 40-month intervals fall in Category C-3, the inspection shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria of Specification 5.5.2.11.e.1, the interval may then be extended to a maximum of once per 40 months; and
3. Additional, unscheduled inservice inspections shall be performed on each SG in accordance with the first sample inspection specified in Table 5.5.2.11-1 during the shutdown subsequent to any of the following conditions:
  - a) Primary-to-secondary tubes leak (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of Technical Specification 3.4.13, or
  - b) A seismic occurrence greater than the Operating Basis Earthquake, or
  - c) A loss-of-coolant accident requiring actuation of the Engineered Safety Features, or
  - d) A main steam line or feedwater line break.

(continued)

5.5 Procedures, Programs, and Manuals

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

4. The provisions of Technical Specifications Surveillance Requirement 3.0.2 are applicable to SG Tube Surveillance inspection frequencies except those established by Category C-3 inspection results.

The above required inservice inspections of SG tubes repaired by sleeving shall be performed at the following frequencies:

1. Steam generator tube sleeves shall be inspected prior to initial operation and in service. The initial operating period before the initial inservice sample inspection shall not be shorter than six months nor longer than 24 months. The inspections of sleeves shall be configured to ensure that each individual sleeve is inspected at least once in 60 months.
2. If the results of the inservice inspection of SG tube sleeves conducted in accordance with Table 5.5.2.11-2 fall in category C-3, the inspection frequency shall be increased to ensure that each remaining sleeve is inspected at least once in 30 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria for Category C-1.

f. Acceptance Criteria

1. Terms as used in this specification will be defined as follows:
  - a) Degradation - A service-induced cracking, wastage, wear, or general corrosion occurring on either inside or outside of a tube;
  - b) Degraded tube - A tube containing imperfections greater than or equal to 20% of the nominal wall thickness cause by degradation;
  - c) % Degradation - The percentage of the tube wall thickness affected or removed by degradation;
  - d) Defect - An imperfection of such severity that it exceeds the repair limit. A tube containing a defect is defective.

(continued)

5.5 Procedures, Programs, and Manuals

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

- e) Imperfection - An exception to the dimensions, finish, or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube wall thickness, if detectable, may be considered as imperfections;
- f) Repair Limit - The imperfection depth at or beyond which the tube shall be removed from service or repaired and is equal to 44% of the nominal tube wall thickness; Sleeves shall be removed from service upon detection of service-induced degradation of the sleeve material or any portion of the sleeve-to-tube weld.
- g) Preservice Inspection - An inspection of the full length of each tube in each SG performed by eddy-current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial MODE 1 operating using the equipment and techniques expected to be used during subsequent inservice inspections. These examinations may be performed prior to steam generator installation. Similarly, for tube repair by sleeving, an inspection of the full length of the pressure boundary portion of the sleeved area shall be performed by eddy current techniques prior to service. This includes pressure retaining portions of the parent tube in contact with the sleeve, the sleeve-to-tube weld, and the pressure retaining portion of the sleeve.
- h) Tube Inspection - An inspection of the SG tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg; and
- i) Unserviceable - The condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operational Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break accident as specified in Specification 5.5.2.11.e.

(continued)

5.5 Procedures, Programs, and Manuals

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

- j) Tube Repair - refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following process:

TIG welded sleeving as described in ABB/CE Topical Report, CEN-630-P, Rev. 2, is currently approved by the NRC.

Tube repair includes the installation by welding of the sleeves, heat treatment in accordance with CEN-630-P, Rev. 2, to remove the stresses that are introduced by the sleeve installation, acceptance testing of the sleeve, and nondestructive examination for future comparison. Tube repair can be performed on certain tubes that have been previously plugged as a corrective or preventive measure. A tube inspection of the full length of the tube shall be performed on a previously plugged tube prior to returning the tube to service.

2. The SG shall be determined OPERABLE after completing the corresponding actions (plug or repair all tubes exceeding the repair limit and all tubes containing through-wall cracks, and plug all sleeved tubes that exceed the repair criteria) required by Tables 5.5.2.11-1 and 5.5.2.11-2.

g. Reports

The content and frequency of written reports shall be in accordance with Technical Specification 5.7.2, "Special Reports."

(continued)

5.5 Procedures, Programs, and Manuals

5.5.2.11 Steam Generator Tube Surveillance Program

TABLE 5.5.2.11-1 (page 1 of 1)

STEAM GENERATOR TUBE INSPECTION  
SUPPLEMENTAL SAMPLING REQUIREMENTS

1st Sample Inspection			2nd Sample Inspection		3rd Sample Inspection	
Sample Size	Result	Action Required	Result	Action Required	Result	Action Required
A minimum of S tubes per SG	C-1	None	N/A	N/A	N/A	N/A
	C-2	Plug or repair by sleeving defective tubes and inspect an additional 2S tubes in this SG.	C-1	None	N/A	N/A
			C-2	Plug or repair by sleeving defective tubes and inspection an additional 4S tubes in this SG.	N/A	N/A
					C-1	N/A
					C-2	Plug or repair by sleeving defective tubes.
			C-3	Perform action for C-3 result of first sample.		
	C-3	Perform action for C-3 result of first sample.	N/A	N/A		
	C-3	Inspect all tubes in this SG plug or repair by sleeving defective tubes and inspect 2S tubes in each other SG.  Notification to NRC pursuant to 10CFR50.72	All other SGs C-1	None	N/A	N/A
			Some SGs C-2 but no other is C-3	Perform action for C-2 result of second sample.	N/A	N/A
			Additional SG is C-3	Inspect all tubes in each SG and plug or repair by sleeving defective tubes. Notification to NRC pursuant to 10CFR50.72.	N/A	N/A

S = 3 N/n % Where N is the number of SGs in the unit and n is the number of SGs inspected during inspection period.

(continued)

5.5 Procedures, Programs, and Manuals

Table 5.5.2.11-2 (page 1 of 1)  
Steam Generator Sleeved Tube Inspection

1st Sample Inspection			2nd Sample Inspection	
Sample Size	Result	Action Required	Result	Action Required
A minimum of 20% of the sleeves.	C-1	None	N.A.	N.A.
	C-2	Plug defective repaired tubes and inspect 100% of the sleeves in this SG	C-1	None
			C-2	Plug defective, repaired tubes.
			C-3	Perform action for C-3 result of first sample.
	C-3	Inspect all repaired tubes in this SG, plug defective repaired tubes, and inspect 20% of the sleeves in the other SG.  Notification to NRC pursuant to 50.72 (b)(2) of 10CFR Part 50	Other SG is C-1	None
			Other SG is C-2	Perform action for C-2 result of first sample.
			Other SG is C-3	Inspect all repaired tubes in both SG's and plug defective repaired tubes.  Notification to NRC pursuant to 50.72 (b)(2) of 10CFR Part 50

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

5.5.2.11.1 The inservice inspection may be limited to one SG on a rotating schedule encompassing 6% of the tubes if the results of the first or previous inspections indicate that all SGs are performing in a like manner. Note that under some circumstances, the operating conditions in one SG may be found to be more severe than those in the other SG. Under such circumstances the sample sequence shall be modified to inspect the most severe conditions.

5.5.2.11.2 The other SG not inspected during the first inservice inspection shall be inspected. The third and subsequent inspections should follow the instructions described in Specification 5.5.2.11.1 above.

### 5.5.2.12 Ventilation Filter Testing Program (VFTP)

This Program establishes the required testing of the Engineered Safety Feature filter ventilation systems, "Control Room Emergency Air Cleanup System" and "Fuel Handling Building Post-accident Cleanup Filter System," in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989. The frequency of testing shall be in accordance with Regulatory Guide 1.52, Revision 2. As a minimum the VFTP program shall include the following:

- a. Inplace testing of the high efficiency particulate air (HEPA) filters to demonstrate acceptable penetration and system bypass when tested at the appropriate system flowrate in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989; and
- b. Inplace testing of the charcoal adsorber to demonstrate acceptable penetration and system bypass when tested at the appropriate system flowrate in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989; and
- c. Laboratory testing of charcoal adsorber samples obtained in accordance with Regulatory Guide 1.52, Revision 2 and tested at the appropriate temperature and relative humidity in accordance with ASTM D3803-1989 to show acceptable methyl iodide penetration; and
- d. Testing to demonstrate the pressure drop across the combined HEPA filters, the prefilters, and the charcoal adsorbers, when tested at the appropriate system flowrate, is acceptable in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989.

(continued)

5.7 Reporting Requirements (continued)

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5.7.2 Special Reports

Special Reports may be required covering inspection, test, and maintenance activities. These special reports are determined on an individual basis for each unit and their preparation and submittal are designated in the Technical Specifications.

Special Reports shall be submitted to the U. S. Nuclear Regulatory Commission, Attention: Document Control Desk, Washington, D. C. 20555, with a copy to the Regional Administrator of the Regional Office of the NRC, in accordance with 10 CFR 50.4 within the time period specified for each report.

The following Special Reports shall be submitted:

- a. When a pre-planned alternate method of monitoring post-accident instrumentation functions is required by Condition B or Condition H of LCO 3.3.11, a report shall be submitted within 30 days from the time the action is required. The report shall outline the action taken, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the function to OPERABLE status.
- b. Any abnormal degradation of the containment structure detected during the tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program shall be reported to the NRC within 30 days. The report shall include a description of the tendon condition, the condition of the concrete (especially at tendon anchorages), the inspection procedures, the tolerances on cracking, and the corrective action taken.
- c. Following each inservice inspection of steam generator (SG) tubes, in accordance with the SG Tube Surveillance Program, the number of tubes plugged and tubes sleeved in each SG shall be reported to the NRC within 15 days. The complete results of the SG tube inservice inspection shall be submitted to the NRC within 12 months following the completion of the inspection. The report shall include:
  1. Number and extent of tubes and sleeves inspected, and
  2. Location and percent of wall-thickness penetration for each indication of an imperfection, and
  3. Identification of tubes plugged and tubes sleeved.

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(continued)



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

SOUTHERN CALIFORNIA EDISON COMPANY

SAN DIEGO GAS AND ELECTRIC COMPANY

THE CITY OF RIVERSIDE, CALIFORNIA

THE CITY OF ANAHEIM, CALIFORNIA

DOCKET NO. 50-362

SAN ONOFRE NUCLEAR GENERATING STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 132  
License No. NPF-15

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Southern California Edison Company, et al. (SCE or the licensee) dated September 16, 1997, as supplemented by letter dated February 23, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

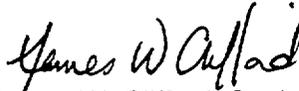
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(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 132 , are hereby incorporated in the license. Southern California Edison Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance and is to be implemented within 30 days of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



James W. Clifford, Senior Project Manager  
Project Directorate IV-2  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: August 26, 1998

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 132 TO FACILITY OPERATING LICENSE NO. NPF-15

DOCKET NO. 50-362

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by Amendment number and contain marginal lines indicating the areas of change.

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5.0-19c  
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3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.13 RCS Operational LEAKAGE

LCO 3.4.13 RCS operational LEAKAGE shall be limited to:

- a. No pressure boundary LEAKAGE;
- b. 1 gpm unidentified LEAKAGE;
- c. 10 gpm identified LEAKAGE;

NOTE: With no SG sleeving installed, d. and e. apply.  
Following installation of any sleeving in any SG, d. and e. do not apply and f. does apply.

- d. 1 gpm total primary to secondary LEAKAGE through all steam generators (SGs); and
- e. 720 gallons per day (1/2 gpm) primary to secondary LEAKAGE through any one SG.
- f. With steam generator sleeving installed in any SG, 150 gallons per day primary to secondary LEAKAGE through any one SG.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCS LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE.	A.1 Reduce LEAKAGE to within limits.	4 hours
B. Required Action and associated Completion Time of Condition A not met.  <u>OR</u> Pressure boundary LEAKAGE exists.	B.1 Be in MODE 3.  <u>AND</u> B.2 Be in MODE 5.	6 hours  36 hours

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.8 Primary Coolant Sources Outside Containment Program (continued)

system (post-accident sampling return piping only). The program shall include the following:

- a. Preventive maintenance and periodic visual inspection requirements; and
- b. Integrated leak test requirements for each system at refueling cycle intervals or less.

### 5.5.2.9 Pre-Stressed Concrete Containment Tendon Surveillance Program

This program provides controls for monitoring any tendon degradation in pre-stressed concrete containment, including effectiveness of its corrosion protection medium, to ensure containment structural integrity. Program itself is relocated to the LCS.

### 5.5.2.10 Inservice Testing Program

This program provides controls for inservice testing of ASME Code Class 1, 2, and 3 components including applicable supports. Program itself is relocated to the LCS.

### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program

This program provides controls for monitoring SG tube degradation. Each SG shall be demonstrated OPERABLE by meeting the requirements of Specification 5.5.2.11 and by meeting an augmented inservice inspection program based on a modification of Regulatory Guide 1.83, Revision 1, which includes at least the following:

#### a. SG Sample Selection and Inspection

Each SG shall be determined OPERABLE during shutdown by selecting and inspecting at least the minimum number of SG specified in Tables 5.5.2.11-1 and 5.5.2.11-2.

#### b. SG Tube Sample Selection and Inspection

The SG tube and sleeve minimum sample size, inspection result classification, and the corresponding action required shall be as specified in Tables 5.5.2.11-1 and 5.5.2.11-2. The inservice inspection of SG tubes and sleeves shall be performed at the frequencies specified in Specification 5.5.2.11.e and the inspected tubes shall be verified acceptable per the acceptance criteria of Specification 5.5.2.11.f. The tubes selected for each inservice inspection shall include at least 3% of the total

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

number of tubes in all SGs; the tubes selected for these inspections shall be selected on a random basis except:

1. Where experience in similar plants with similar water chemistry indicates critical areas to be inspected, then at least 50% of the tubes inspected shall be from the critical areas;
2. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each SG shall include:
  - a) All non-repaired tubes that previously had detectable wall penetrations (greater than 20%),
  - b) Tubes in those areas where experience has indicated potential problems, and
  - c) A tube inspection (pursuant to Specification 5.5.2.11.f) shall be performed on each selected tube. If any selected tube does not permit the passage of the eddy current probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection.
3. All sleeves shall be inspected with eddy current prior to initial operation. This includes pressure retaining portions of the parent tube in contact with the sleeve, the sleeve-to-tube weld and the pressure retaining portion of the sleeve.
4. Following the preservice inspection, 20% of sleeves that have been in service for a full cycle of operation shall be inspected. The sleeves shall be selected on a random basis. If indications of degradation are found in the sample the inspection sample shall be expanded. Table 5.5.2.11-2 contains the requirements for sample expansion.

(continued)

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

c. Examination Results

The results of each sample inspection shall be classified into one of the following three categories:

- C-1 Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
- C-2 One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
- C-3 More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

This classification shall also apply to sample inspections of sleeves.

-----NOTE-----  
In all inspections, previously degraded non-repaired tubes must exhibit significant (greater than 10%) further wall penetrations to be included in the above percentage calculations.  
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d. Supplemental Sampling Requirements

The tubes selected as the second and third samples (if required by Table 5.5.2.11-1) may be subjected to a partial tube inspection provided:

1. The tubes selected for these samples include the tubes from those areas of the tube sheet array where tubes with imperfections were previously found, and
2. The inspections include those portions of the tubes where imperfections were previously found.

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

#### e. Inspection Frequency

The above required inservice inspections of the non-repaired SG tubes shall be performed at the following frequencies:

1. The first inservice inspection shall be performed after 6 effective full power months but within 24 calendar months of initial critically. Subsequent inservice inspections shall be performed at intervals of not less than 12 nor more than 24 calendar months after the previous inspection. If two consecutive inspections, not including the preservice inspection, result in all inspections results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months;
2. If the results of the inservice inspection of a SG conducted in accordance with Table 5.5.2.11-1 at 40-month intervals fall in Category C-3, the inspection shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria of Specification 5.5.2.11.e.1, the interval may then be extended to a maximum of once per 40 months; and
3. Additional, unscheduled inservice inspections shall be performed on each SG in accordance with the first sample inspection specified in Table 5.5.2.11-1 during the shutdown subsequent to any of the following conditions:
  - a) Primary-to-secondary tubes leak (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of Technical Specification 3.4.13, or
  - b) A seismic occurrence greater than the Operating Basis Earthquake, or
  - c) A loss-of-coolant accident requiring actuation of the Engineered Safety Features, or
  - d) A main steam line or feedwater line break.

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

4. The provisions of Technical Specifications Surveillance Requirement 3.0.2 are applicable to SG Tube Surveillance inspection frequencies except those established by Category C-3 inspection results.

The above required inservice inspections of SG tubes repaired by sleeving shall be performed at the following frequencies:

1. Steam generator tube sleeves shall be inspected prior to initial operation and in service. The initial operating period before the initial inservice sample inspection shall not be shorter than six months nor longer than 24 months. The inspections of sleeves shall be configured to ensure that each individual sleeve is inspected at least once in 60 months.
2. If the results of the inservice inspection of SG tube sleeves conducted in accordance with Table 5.5.2.11-2 fall in category C-3, the inspection frequency shall be increased to ensure that each remaining sleeve is inspected at least once in 30 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria for Category C-1.

#### f. Acceptance Criteria

1. Terms as used in this specification will be defined as follows:
  - a) Degradation - A service-induced cracking, wastage, wear, or general corrosion occurring on either inside or outside of a tube;
  - b) Degraded tube - A tube containing imperfections greater than or equal to 20% of the nominal wall thickness cause by degradation;
  - c) % Degradation - The percentage of the tube wall thickness affected or removed by degradation;
  - d) Defect - An imperfection of such severity that it exceeds the repair limit. A tube containing a defect is defective.

(continued)

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

- e) Imperfection - An exception to the dimensions, finish, or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube wall thickness, if detectable, may be considered as imperfections;
- f) Repair Limit - The imperfection depth at or beyond which the tube shall be removed from service or repaired and is equal to 44% of the nominal tube wall thickness; Sleeves shall be removed from service upon detection of service-induced degradation of the sleeve material or any portion of the sleeve-to-tube weld.
- g) Preservice Inspection - An inspection of the full length of each tube in each SG performed by eddy-current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial MODE 1 operating using the equipment and techniques expected to be used during subsequent inservice inspections. These examinations may be performed prior to steam generator installation. Similarly, for tube repair by sleeving, an inspection of the full length of the pressure boundary portion of the sleeved area shall be performed by eddy current techniques prior to service. This includes pressure retaining portions of the parent tube in contact with the sleeve, the sleeve-to-tube weld, and the pressure retaining portion of the sleeve.
- h) Tube Inspection - An inspection of the SG tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg; and
- i) Unserviceable - The condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operational Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break accident as specified in Specification 5.5.2.11.e.

(continued)

5.5 Procedures, Programs, and Manuals

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5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

- j) Tube Repair - refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following process:

TIG welded sleeving as described in ABB/CE Topical Report, CEN-630-P, Rev. 2, is currently approved by the NRC.

Tube repair includes the installation by welding of the sleeves, heat treatment in accordance with CEN-630-P, Rev. 2, to remove the stresses that are introduced by the sleeve installation, acceptance testing of the sleeve, and nondestructive examination for future comparison. Tube repair can be performed on certain tubes that have been previously plugged as a corrective or preventive measure. A tube inspection of the full length of the tube shall be performed on a previously plugged tube prior to returning the tube to service.

2. The SG shall be determined OPERABLE after completing the corresponding actions (plug or repair all tubes exceeding the repair limit and all tubes containing through-wall cracks, and plug all sleeved tubes that exceed the repair criteria) required by Tables 5.5.2.11-1 and 5.5.2.11-2.

g. Reports

The content and frequency of written reports shall be in accordance with Technical Specification 5.7.2, "Special Reports."

(continued)

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5.5.2.11 Steam Generator Tube Surveillance Program

TABLE 5.5.2.11-1 (page 1 of 1)

STEAM GENERATOR TUBE INSPECTION  
SUPPLEMENTAL SAMPLING REQUIREMENTS

1st Sample Inspection			2nd Sample Inspection		3rd Sample Inspection	
Sample Size	Result	Action Required	Result	Action Required	Result	Action Required
A minimum of S tubes per SG	C-1	None	N/A	N/A	N/A	N/A
	C-2	Plug or repair by sleeving defective tubes and inspect an additional 2S tubes in this SG.	C-1	None	N/A	N/A
			C-2	Plug or repair by sleeving defective tubes and inspection an additional 4S tubes in this SG.	N/A	N/A
					C-1	N/A
					C-2	Plug or repair by sleeving defective tubes.
	C-3	Perform action for C-3 result of first sample.	N/A	N/A		
	C-3	Inspect all tubes in this SG plug or repair by sleeving defective tubes and inspect 2S tubes in each other SG.  Notification to NRC pursuant to 10CFR50.72	All other SGs C-1	None	N/A	N/A
			Some SGs C-2 but no other is C-3	Perform action for C-2 result of second sample.	N/A	N/A
			Additional SG is C-3	Inspect all tubes in each SG and plug or repair by sleeving defective tubes. Notification to NRC pursuant to 10CFR50.72.	N/A	N/A

S = 3 N/n % Where N is the number of SGs in the unit and n is the number of SGs inspected during inspection period.

(continued)

5.5 Procedures, Programs, and Manuals

Table 5.5.2.11-2 (page 1 of 1)  
Steam Generator Sleeved Tube Inspection

1st Sample Inspection			2nd Sample Inspection	
Sample Size	Result	Action Required	Result	Action Required
A minimum of 20% of sleeves.	C-1	None	N.A.	N.A.
	C-2	Plug defective repaired tubes and inspect 100% of the sleeves in this SG	C-1	None
			C-2	Plug defective, repaired tubes.
			C-3	Perform action for C-3 result of first sample.
	C-3	Inspect all repaired tubes in this SG, plug defective repaired tubes, and inspect 20% of the sleeves in the other SG.  Notification to NRC pursuant to 50.72 (b)(2) of 10CFR Part 50	Other SG is C-1	None
			Other SG is C-2	Perform action for C-2 result of first sample.
			Other SG is C-3	Inspect all repaired tubes in both SG's and plug defective repaired tubes.  Notification to NRC pursuant to 50.72 (b)(2) of 10CFR Part 50

(continued)

## 5.5 Procedures, Programs, and Manuals

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### 5.5.2.11 Steam Generator (SG) Tube Surveillance Program (continued)

5.5.2.11.1 The inservice inspection may be limited to one SG on a rotating schedule encompassing 6% of the tubes if the results of the first or previous inspections indicate that all SGs are performing in a like manner. Note that under some circumstances, the operating conditions in one SG may be found to be more severe than those in the other SG. Under such circumstances the sample sequence shall be modified to inspect the most severe conditions.

5.5.2.11.2 The other SG not inspected during the first inservice inspection shall be inspected. The third and subsequent inspections should follow the instructions described in Specification 5.5.2.11.1 above.

### 5.5.2.12 Ventilation Filter Testing Program (VFTP)

This Program establishes the required testing of the Engineered Safety Feature filter ventilation systems, "Control Room Emergency Air Cleanup System" and "Fuel Handling Building Post-accident Cleanup Filter System," in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989. The frequency of testing shall be in accordance with Regulatory Guide 1.52, Revision 2. As a minimum the VFTP program shall include the following:

- a. Inplace testing of the high efficiency particulate air (HEPA) filters to demonstrate acceptable penetration and system bypass when tested at the appropriate system flowrate in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989; and
- b. Inplace testing of the charcoal adsorber to demonstrate acceptable penetration and system bypass when tested at the appropriate system flowrate in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989; and
- c. Laboratory testing of charcoal adsorber samples obtained in accordance with Regulatory Guide 1.52, Revision 2 and tested at the appropriate temperature and relative humidity in accordance with ASTM D3803-1989 to show acceptable methyl iodide penetration; and
- d. Testing to demonstrate the pressure drop across the combined HEPA filters, the prefilters, and the charcoal adsorbers, when tested at the appropriate system flowrate, is acceptable in accordance with Regulatory Guide 1.52, Revision 2, and ASME N510-1989.

(continued)

## 5.7 Reporting Requirements (continued)

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### 5.7.2 Special Reports

Special Reports may be required covering inspection, test, and maintenance activities. These special reports are determined on an individual basis for each unit and their preparation and submittal are designated in the Technical Specifications.

Special Reports shall be submitted to the U. S. Nuclear Regulatory Commission, Attention: Document Control Desk, Washington, D. C. 20555, with a copy to the Regional Administrator of the Regional Office of the NRC, in accordance with 10 CFR 50.4 within the time period specified for each report.

The following Special Reports shall be submitted:

- a. When a pre-planned alternate method of monitoring post-accident instrumentation functions is required by Condition B or Condition H of LCO 3.3.11, a report shall be submitted within 30 days from the time the action is required. The report shall outline the action taken, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the function to OPERABLE status.
- b. Any abnormal degradation of the containment structure detected during the tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program shall be reported to the NRC within 30 days. The report shall include a description of the tendon condition, the condition of the concrete (especially at tendon anchorages), the inspection procedures, the tolerances on cracking, and the corrective action taken.
- c. Following each inservice inspection of steam generator (SG) tubes, in accordance with the SG Tube Surveillance Program, the number of tubes plugged and tubes sleeved in each SG shall be reported to the NRC within 15 days. The complete results of the SG tube inservice inspection shall be submitted to the NRC within 12 months following the completion of the inspection. The report shall include:
  1. Number and extent of tubes and sleeves inspected, and
  2. Location and percent of wall-thickness penetration for each indication of an imperfection, and
  3. Identification of tubes plugged and tubes sleeved.

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(continued)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 140 TO FACILITY OPERATING LICENSE NO. NPF-10  
AND AMENDMENT NO. 132 TO FACILITY OPERATING LICENSE NO. NPF-15  
SOUTHERN CALIFORNIA EDISON COMPANY  
SAN DIEGO GAS AND ELECTRIC COMPANY  
THE CITY OF RIVERSIDE, CALIFORNIA  
THE CITY OF ANAHEIM, CALIFORNIA  
SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3  
DOCKET NOS. 50-361 AND 50-362

1.0 INTRODUCTION

By application dated September 16, 1997, as supplemented by letter dated February 23, 1998, Southern California Edison (the licensee), submitted a request to change the Technical Specifications (TS) at San Onofre Nuclear Generating Station (SONGS), Units 2 and 3. The proposed changes would allow sleeving of steam generator tubes with sleeves designed by the vendor, ASEA Brown Boveri/Combustion Engineering (ABB/CE). Additionally, the proposed TS amendment would require that sleeves be removed from service upon detection of service-induced degradation, require post weld heat treatment (PWHT) of sleeve welds, and reduce the allowable primary to secondary leakage through any one steam generator to 150 gallons per day (gpd).

The revised TS would reference the current generic topical report for ABB/CE welded sleeves, CEN-630-P, Revision 2, "Repair of 3/4 O.D. Steam Generator Tubes Using Leak Tight Sleeves," dated June 1997, and 96-OSW-003-P, Rev. 00, "EPRI Steam Generator Examination Guidelines - Appendix H Qualification For Eddy Current Plus-Point Probe Examination of ABB/CE Welded Sleeves." Because the bulk of the technical and regulatory issues for the present request are identical to those reviewed in the previous Safety Evaluations (SEs) for ABB/CE sleeves, this SE discusses only those issues warranting revision, amplification or inclusion based on current experience.

Details of prior staff evaluations of ABB/CE sleeves may also be found in the SEs for Waterford Steam Electric Station, Unit 3, Docket No. 50-382, dated December 14, 1995; Byron Nuclear Power Station, Units 1 and 2 and Braidwood Nuclear Power Station, Units 1 and 2, Docket Nos. 50-454, 50-455, 50-456, and 50-457, dated April 12, 1996; Zion Nuclear Power Station, Units 1

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and 2, Docket Nos. 50-295 and 50-304, dated October 29, 1996; Prairie Island, Units 1 and 2, Docket Nos. 50-282 and 50-306, dated November 4, 1997; and Beaver Valley, Unit 1, Docket No. 50-334, dated November 25, 1997. These evaluations apply to the proposed SONGS 2 and 3 license amendments.

The February 23, 1998, supplemental letter provided additional clarifying information and did not change the staff's original no significant hazards consideration determination published in the Federal Register on January 28, 1998 (63 FR 4323).

## 2.0 BACKGROUND

Previous staff evaluations of ABB/CE sleeves addressed the technical adequacy of the sleeves in the four principal areas of pressure retaining component design: structural requirements, material of construction, welding, and non-destructive examination. The staff found the analyses and tests that were submitted by Southern California Edison provided technical justification that are sufficiently bounded by these other licensees' submittals. The staff, therefore, found these areas of component design to be acceptable for SONGS Units 2 and 3.

The function of sleeves is to restore the structural and leakage integrity of the tube pressure boundary. Consequently, structural analyses were performed for a variety of loadings including design pressure, operating transients, and other parameters selected to envelope loads imposed during normal operating, upset, and accident conditions. Stress analyses of sleeved tube assemblies were performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code (the Code), Section III. The licensee cited these analyses, along with the results of qualification testing and previous plant operating experience, to demonstrate that the sleeved tube assembly is capable of restoring steam generator tube integrity.

The two proposed ABB/CE sleeve types are an expansion transition zone (ETZ) sleeve and a tube support plate (TSP) sleeve. An ETZ sleeve is designed to restore the portion of a tube in the vicinity of the top of the steam generator (SG) tubesheet. A TSP sleeve can be used to span a support plate elevation or be used on a freespan section of tube. The sleeve material is a nickel-iron-chromium alloy, Alloy 690, a Code approved material (ASME SB-163), incorporated in ASME Code Case N-20.

The ABB/CE sleeves are installed using gas tungsten arc welding to join the sleeve to the parent tube at the upper (free span) end of the ETZ sleeve and at both ends of a TSP sleeve. The lower ETZ sleeve tube joint is hard-rolled into the tubesheet below the expansion zone. The centerline of the welds forms the pressure boundary transition between the sleeve and the tube. Considering the unreliability of sleeve life predictions, the staff has typically required licensees to inspect a sample of sleeves at each outage. Periodic inservice inspections will provide assurance that any service induced degradation in sleeves is detected and addressed appropriately. Inservice inspection requirements applicable to the licensee's proposed amendment request are discussed further in Section 3.4 of this safety evaluation.

### 3.0 DISCUSSION

Experience with all types of SG tube sleeves has led to several areas of concern outside the scope of basic sleeve design and qualification discussed in the previous SEs. These include weld preparation, weld acceptance inspections, service life predictions for sleeved SG tubes, sleeve plugging limits, post weld heat treatment, and primary-to-secondary leakage limits.

#### 3.1 Weld Preparation

Prior to performing any weld, the surface of the metal(s) to be welded must be cleaned. For sleeve installation, the inner diameter of the parent tube at the desired weld location must be cleaned of service induced oxides. For the ABB/CE sleeving process, this is accomplished using motorized wire brushes.

Based on recent findings during the inspection of sleeves at other plants, ABB/CE revised the cleaning method to ensure optimum removal of service induced oxides. The revised cleaning procedure entailed some equipment changes. More significantly, from a quality assurance standpoint, a 100 percent visual testing (VT) of the cleaning process was instituted. After the wire brush cleaning step, every tube is given a VT using a remote fiber optic camera system to confirm that adequate surface cleaning has been accomplished. As required by proposed TS 5.5.2.11.f.1(j), the weld preparation VT inspection program requires a full length inspection of previously plugged tubes that are sleeved prior to returning the tube to service. This provides for tubes that had previously been plugged, and thus out of service for some time period, to be fully inspected for potential defects in other than the area that was sleeved prior to restoring the tube to service. This provides reasonable assurance that no additional defects exist in the tubes prior to return to service, and is, therefore, acceptable.

#### 3.2 Weld Acceptance Inspections

For compliance with the Code and regulatory requirements, initial and periodic examinations of steam generator tubes and sleeves are performed. Sleeve welds were historically accepted based on VT and ultrasonic testing (UT) examinations. Eddy current testing (ET) was used for an initial baseline inspection for comparison with later required periodic inspections. The reason for the different types of nondestructive examinations (NDE) being used for initial acceptance versus periodic reinspection is due to the differences between potential flaws from initial installation defects and service induced degradation. The different NDE techniques have normally been better suited for the respective types of anticipated flaws.

Past field experience suggested that the current initial acceptance examinations (VT and UT) may not be sufficient in every circumstance. As a result, the weld acceptance NDE was modified to include:

- \* 100 percent UT with an enhanced digitized amplitude system
- \* 100 percent ET using the Plus Point probe

The original UT procedure was based upon the absence of a mid-wall reflection. In that procedure, the sleeve outside diameter wall reflection was readily apparent beyond the fusion

zone of the weld, thus signifying lack of fusion with the parent tube. When fusion existed, the mid-wall reflection (mid-wall of the fused sleeve and tube combination) would not appear since no interface would exist. Field experience led ABB/CE to discover that lack of fusion caused by axially oriented oxide inclusion from a poorly cleaned weld would not be detected since the oxides did not cause a large sound reflection.

In the enhanced UT procedure, the back wall signal from the outside of the parent tube is also monitored for presence in the fused area. Additionally, the back wall signal strength is examined for excessive attenuation. Attenuation beyond the normal amount can be interpreted, along with other signal artifacts, as either a weld that is too narrow or one with inclusions or patches of unfused material. The modified UT procedure was extensively tested on laboratory produced welds containing a variety of inclusion/lack of fusion defects. Samples were destructively examined and the metallurgical sections compared with the UT results. Comparison of results demonstrated the revised UT procedure was highly reliable, and that no significant defects could remain undetected by the enhanced UT procedure.

ET with the plus point probe is now part of the sleeve weld acceptance criteria. Field experience led ABB/CE to discover that weld suckback and circumferentially oriented oxide inclusions from a poorly cleaned weld would not be detected by UT. ABB/CE has shown the plus point probe reliably detects the various process-induced weld defects including blowholes, weld suckback and circumferentially oriented oxide inclusions. ABB/CE has also shown the ET can reliably locate the position of the defect with respect to the weld centerline which is considered the pressure boundary. Any ET indication found below the weld centerline of the upper weld or above the weld centerline of the lower weld (i.e., inside the sleeve pressure boundary) requires the tube to be plugged if the ET indication does not meet the UT requirements.

The proposed inspections provide reasonable assurance that sleeved tubes will be placed in service only after verification of acceptable installation. The staff, therefore, finds the proposed inspections acceptable.

### 3.3 Inservice Inspection Requirements

Included in the licensee's proposed amendment request are changes that would require the licensee to perform an inspection of a number of sleeves at each refueling outage. The minimum sample requirements for tube inspections, which are specified in "Steam Generator Sample Selection and Inspection" within TS 5.5.2.11, are established to assess the overall condition of the steam generator. Because sleeved tubes are of a slightly different configuration and may be more susceptible to stress corrosion cracking than unrepaired tubing, the inservice inspection requirements currently specified in the TS may not be sufficient to address the condition of these tubes.

The licensee has proposed to include additional inservice inspection requirements in the TS to address sleeves. The changes would require the inspection of at least 20 percent of all installed sleeves. This proposal is consistent with current industry guidance for steam generator sleeve examinations. EPRI recommends a 20 percent sample inspection for sleeves. In addition to the licensee's proposal, the results from inspections would be classified and,

depending on the classification, may require the performance of additional inspections of sleeves.

The proposed inspection requirements provide reasonable assurance that service-induced degradation in SG tubes sleeves will be detected thus minimizing potential events related to SG tube integrity and are, therefore, acceptable.

### 3.4 Sleeve Plugging Limits

The sleeve minimum acceptable wall thickness is determined using the criteria of Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes" and ASME Code Section III allowable stress values and pressure stress equations. The sleeve structural limit, which was calculated based on the most limiting of normal, upset, or faulted conditions for 3/4-inch outside diameter steam generator tubes in ABB/CE designed generators, was determined to be 49 percent of the sleeve nominal wall thickness based on ASME Code minimum material properties in accordance with staff positions. However, the licensee has proposed to remove sleeves from service upon detection of service-induced degradation of the sleeve material or any portion of the sleeve-to-tube weld which provides assurance that tubes will maintain adequate margins for structural integrity during the next cycle of operation.

The proposed change is more conservative than industry and staff acceptance criteria, and provides reasonable assurance that tube structural integrity is maintained throughout each operating cycle and is, therefore, acceptable.

### 3.5 Post Weld Heat Treatment (PWHT)

Accelerated corrosion tests confirm that a PWHT significantly improves the intergranular stress corrosion cracking (IGSCC) resistance of the alloy 600 parent tube material in the weld zone. Proposed TS 5.5.2.11.f.1.(j) requires a PWHT of the welded joints in accordance with the ABB/CE topical report, CEN-630-P, Revision 2. The staff has determined that this topical report is appropriate for use at SONGS Units 2 and 3. Since this treatment improves resistance to IGSCC, the staff finds the proposed change acceptable.

### 3.6 Primary-to-Secondary Leakage Limits

The licensee proposes to adopt a 150 gallon per day (gpd) limit on primary-to-secondary leakage in SGs with tube sleeves installed. This limit is more restrictive than the current TS limit of 720 gpd in any one SG, and would require earlier action to in the event of a tube leak to assure defense-in-depth for postulated accidents. Since the proposed change is more restrictive, the plant design remains bounded by the current SG tube rupture analysis and is, therefore, acceptable.

### 3.7 Change in Reporting Requirements

The licensee is incorporating a change to TS 5.7.2 to modify the SG inspection reporting requirements to add reporting on the number and extent of sleeves that are inspected. This is an administrative change only that adds reporting requirements, and is therefore acceptable.

### 3.8 Technical Specification Changes

In order to incorporate the proposed changes to permit sleeving of the degraded tubes in San Onofre Nuclear Generating Station, Units 2 and 3, steam generators, the licensee has proposed the following changes to the TS. The evaluation of these changes is provided in the preceding sections of this SE.

#### 1. Proposed Changes to TS 3.4.13

The allowable primary to secondary leakage through any one SG is reduced to 150 gallons per day.

#### 2. Proposed Changes to TS 5.5.2.11.b, "Steam Generator Tube Sample Selection and Inspection"

A new requirement is added to specify that a minimum sample inspection of 20 percent of the total number of sleeves in service is required. In addition, the results of the sleeve inspections are to be classified and additional actions taken, if necessary, per Table TS 5.5.2.11-2.

#### 3. Proposed Changes to TS 5.5.2.11(f), "Repair Limit"

The definition of Repair Limit is modified to specify that the sleeve shall be removed from service upon detection of service-induced degradation of the sleeve material or any portion of the sleeve-to-tube weld.

#### 4. Proposed New TS 5.5.2.11(j)

A section is added to specify that tube repair using ABB/CE welded sleeves shall be in accordance with the methods described in ABB/CE topical reports CEN-630-P, Revision 2. In addition, the proposed section indicates that a PWHT of the sleeve welds as described in ABB/CE report CEN-630-P shall be performed.

#### 5. Proposed New Table TS 5.5.2.11-2, "Steam Generator Sleeved Tube Inspection"

Table TS 5.5.2.11-2 is added to the TS to specify that a 20-percent sample inspection is required for tube sleeves. In addition, the table also states the actions (i.e., additional inspections) necessary based on the results classification from the initial sample.

The staff has reviewed the proposed changes to the TS, and determined that sleeved tubes will continue to maintain safety margins consistent with the stress limits in ASME Section III. In addition, the proposed TS provide an acceptable basis to assure an adequate inspection program and operational leakage limits to assure the plant is operated within its current design basis for SG tube integrity. The staff, therefore, finds the proposed changes acceptable.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the California State official was notified of the proposed issuance of the amendments. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (63 FR 4323). The amendments also change recordkeeping or reporting requirements. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and (c)(10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: E. Debec-Mathet

Date: August 26, 1998