

May 30, 1997

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

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION UNIT 3 STEAM GENERATOR  
EGGCRATE DEGRADATION ISSUE

Dear Mr. Nunn:

The purpose of this letter is to acknowledge the commitments made in your letter dated May 16, 1997, regarding the recent findings of eggcrate degradation in the San Onofre Unit 3 steam generators. Specifically, Southern California Edison (SCE) committed to submit a comprehensive evaluation of the condition of the San Onofre Unit 3 steam generators at least 7 days prior to entry into Mode 4. Following submittal of this report, SCE will meet with the NRC staff to discuss this evaluation prior to Mode 4 entry. SCE further committed to submit a final report within 90 days after restart from the current refueling outage.

Enclosed is a list of areas that, as a minimum, should be thoroughly addressed in the forthcoming report. If you have any questions, please call me at (301) 414-3062.

Sincerely,

Original Signed By

Mel B. Fields, Project Manager  
Project Directorate IV-2  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-362

Enclosure: Eggcrate Evaluation Areas

cc w/encl: See next page

DISTRIBUTION:

Docket File  
PUBLIC  
PDIV-2 Reading  
JRoe  
EAdensam  
WBateman  
MFields  
EPeyton  
ACRS, TWFN  
OGC, 015B18  
KPerkins, RIV/WCFO  
PGywnn, RIV

DOCUMENT NAME: EGGCRATE.NUN

OFC	PDIV-2/PM	PDIV-2/LA
NAME	MFields	EPeyton
DATE	5/30/97	5/30/97

OFFICIAL RECORD COPY

9706050257 970530  
PDR ADDCK 05000362  
P PDR

NRC FILE CENTER COPY



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 30, 1997

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

SUBJECT: SAN ONOFRE NUCLEAR GENERATING STATION UNIT 3 STEAM GENERATOR  
EGGCRATE DEGRADATION ISSUE

Dear Mr. Nunn:

The purpose of this letter is to acknowledge the commitments made in your letter dated May 16, 1997, regarding the recent findings of eggcrate degradation in the San Onofre Unit 3 steam generators. Specifically, Southern California Edison (SCE) committed to submit a comprehensive evaluation of the condition of the San Onofre Unit 3 steam generators at least 7 days prior to entry into Mode 4. Following submittal of this report, SCE will meet with the NRC staff to discuss this evaluation prior to Mode 4 entry. SCE further committed to submit a final report within 90 days after restart from the current refueling outage.

Enclosed is a list of areas that, as a minimum, should be thoroughly addressed in the forthcoming report. If you have any questions, please call me at (301) 415-3062.

Sincerely,

A handwritten signature in cursive script, reading "Mel B. Fields", is written over the typed name.

Mel B. Fields, Project Manager  
Project Directorate IV-2  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-362

Enclosure: Eggcrate Evaluation Areas

cc w/encl: See next page

cc w/encl:

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

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

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

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

Dr. Harvey Collins, Chief  
Division of Drinking Water  
and Environmental Management  
California Department of Health Services  
P. O. Box 942732  
Sacramento, California 94234-7320

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

Mr. Terry Winter  
Manager, Power Operations  
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

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

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

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

## SAN ONOFRE NUCLEAR GENERATING STATION UNIT 3

### STEAM GENERATOR EGGCRATE ISSUE

#### EVALUATION AREAS

1. The ATHOS code was used to assist in the prediction of flow accelerated corrosion (FAC) regions areas for the San Onofre Unit 3 steam generators (SGs). Discuss the ability of ATHOS to predict the lack of FAC regions observed in the SONGS Unit 2 SGs.
2. Discuss your approach for determining the eggcrate degradation mechanism. Discuss the cause of the degradation mechanism, how it will be minimized or eliminated and how this will be verified. Discuss implications for the Unit 2 SGs and relevant actions that will be taken.
3. Discuss the objectives and results from secondary side visual (and eddy current, if applicable) inspections. Discuss how the baseline condition (current condition) of the eggcrates is being determined, how and which structural elements are being measured, and in what form the baseline conditions are being recorded.
4. Discuss the extent of the eggcrate degradation and how this affects SG tube integrity for the full range of test, normal operating, and accident conditions. Discuss the design bases for the eggcrate structures in the SONGS SGs and how the design bases are affected by the degradation. Discuss the criteria and the basis for criteria that will be applied for dispositioning tubes potentially affected by loss of eggcrate support.
5. Discuss future inspection plans related to the eggcrates for both SONGS units. Discuss the techniques, the scope, and the disposition process (acceptance criteria).
6. Discuss the approach to be used to determine the potential growth rate of degradation of the eggcrate structures.
7. Discuss how the potential growth rate of degradation of the eggcrate structures is being incorporated into the assessment of the length of the next operating cycle. Discuss the proposed length of the next operating cycle for Unit 3 and provide the basis for the proposed length. Address the probability for tube rupture to occur during the current operating cycle for Unit 2 and during the next operating cycle for Unit 3 as a result of operating with potential or actual degradation of the eggcrate structures and whether or not the probability of tube rupture has increased. Discuss the possibility that the margins of safety in the eggcrate structures and affected tubes have decreased as a result of the observed degradation.

8. Explain in sufficient detail the analysis performed to verify the functionality of the Unit 3 SG tubes under design basis accident conditions, considering the identified degradation of the eggcrates. State if the analysis is linear or non-linear and explain how the gaps between the tubes and support plates are represented in the structural model. Also, explain how each loading is applied to the tubes, and how tube deformations/stresses are determined under combined loading conditions.
9. Identify the materials used for all the structural elements associated with the tube supports (e.g., eggcrate supports, baffle, deflector, vertical support grids, diagonal spacer strips, wrapper bar). Also identify the design and acceptance criteria used for determining the adequacy of tube support structural elements. Specifically, state the Code, Section and Editions from which the acceptance criteria were established and provide the basis for your choice.
10. In assessing the fluid-elastic instability of the SG tubes due to critical flow-induced vibration, discuss the details of the formulas used for determining the critical flow velocity under degraded SG eggcrate condition. Justify any empirical parameters used.
11. Confirm the calculated cross flow velocities by actual measurements of some critical local cross flow velocities in the secondary side flow of the SG under the degraded conditions.
12. Confirm the calculated natural frequency of the most critical SG tubes with available test data which is representative of the degraded eggcrate and inboard lattice bars conditions.
13. For the evaluation of SG tube stresses under accident conditions, confirm that the normal flow-induced vibration load under degraded conditions is combined with the accident loads.