NUREG-0712
Supplement No. 5

Safety Evaluation Report

related to the operation of
San Onofre Nuclear Generating Station,
Units 2 and 3

Docket Nos. 50-361 and 50-362

Southern California Edison Company, et al.

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

February 1982

NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 1717 H Street, N.W.
   Washington, DC 20555
2. The NRC/GPO Sales Program, U.S. Nuclear Regulatory Commission,
   Washington, DC 20555
3. The National Technical Information Service, Springfield, VA 22161

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC Office of Inspection and Enforcement bulletins, circulars, information notices, inspection and investigation notices; Licensee Event Reports; vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the NRC/GPO Sales Program: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, and NRC booklets and brochures. Also available are Regulatory Guides, NRC regulations in the *Code of Federal Regulations*, and *Nuclear Regulatory Commission Issuances*.

Documents available from the National Technical Information Service include NUREG series reports and technical reports prepared by other federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission.

Documents available from public and special technical libraries include all open literature items, such as books, journal and periodical articles, and transactions. *Federal Register* notices, federal and state legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free upon written request to the Division of Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, 7920 Norfolk Avenue, Bethesda, Maryland, and are available there for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

GPO Printed copy price: $3.00

NUREG-0712
Supplement No. 5

Safety Evaluation Report

related to the operation of San Onofre Nuclear Generating Station, Units 2 and 3

Docket Nos. 50-361 and 50-362

Southern California Edison Company, et al.

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

February 1982

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

1 INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

On December 31, 1980, the Nuclear Regulatory Commission (NRC) staff issued a partial Safety Evaluation Report (SER) covering the geology and seismology aspects of the San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 and 3, or San Onofre 2 and 3). On February 6, 1981, the staff issued a complete SER covering all non-TMI-related aspects of our safety review of San Onofre 2 and 3, including, for convenience, the previously issued geology and seismology sections. On February 25, 1981, the staff issued Supplement No. 1 to the SER which addressed the TMI-related aspects of our safety review. On May 8, 1981, the staff issued Supplement No. 2 to the SER, which addressed a number of the open items identified in the SER and in Supplement No. 1 to the SER. On September 16, 1981, the staff issued Supplement No. 3 to the SER, in which we updated the status of our review with regard to certain of the items that were left unresolved in Supplement No. 2 to the SER. On January 22, 1982, the staff issued Supplement No. 4 to the SER in which we addressed the open items identified in the SER and previous supplements, as well as several TMI-related items, for which the applicants had requested relief from the dated requirements of NUREG-0737.

In this supplement to the SER, we address several items that have come to light since the previous supplement was issued, including an additional applicant request for relief from certain dated requirements of NUREG-0737.

The items addressed in this report are covered in sections having the same number and title as the section of the SER or SER Supplement in which they were previously discussed. Appendix A to this report is a continuation of the chronology of the radiological review of San Onofre 2 and 3. Appendix B contains errata to the SER and previous SER supplements. Appendix C is a list of the principal NRC staff reviewers who contributed to this supplement. The NRC project manager for San Onofre 2 and 3 is Mr. Harry Rood. Mr. Rood may be contacted by writing to the Division of Licensing, U.S. Nuclear Regulatory Commission, Washington, D.C., 20555.

1.7 Summary of Outstanding Issues

In its Partial Initial Decision on San Onofre 2 and 3 of January 11, 1982, the Atomic Safety and Licensing Board authorized issuance of a license permitting "the loading of fuel and low power testing (up to 5 percent of rated power) for Unit 2 of the San Onofre Nuclear Generating Station."

The Board's Order was subject to the following condition: "that the Emergency Plan for Units 2 and 3 will be in effect prior to the first fuel loading activities, including complete implementing procedures and accomplishment of all required training. Satisfaction of this condition shall be evidenced by an NRC inspection and report to the Board. If any deficiencies are found, the report shall include an assessment of their significance to the activities authorized by this Order."

By letter dated February 12, 1982, the NRC staff submitted the required report to the Board, in satisfaction of the condition in the Board's Order.

At this time there are no outstanding issues that must be resolved prior to issuance of an operating license for San Onofre 2 authorizing fuel loading and operation at power levels up to five percent of full power.

1.9 License Conditions

In the SER and previous SER supplements, a number of potential license conditions were discussed. By letter dated February 3, 1982, the applicants have identified three areas where plant modifications have been completed, thereby eliminating the need for a license condition. These areas are:

(1) Control room design review (NUREG-0737 Item I.D.1). Items 1.0, 2.0, and 3.0 have been completed. See Section 22.2 (I.D.1) of Supplement 1 to the SER.

(2) Additional accident monitoring instrumentation (NUREG-0737 Item II.F.1, Attachment 6). One channel of the containment atmosphere hydrogen concentration monitor has been attached to a recorder. See Section 22.2 (II.F.1) of Supplement 1 to the SER.

(3) Upgraded emergency preparedness (NUREG-0737 Item III.A.1.1). The applicants have completed installation and operational testing of the 10-mile emergency planning zone early warning system. See Section 22.2 (III.A.1.1) of Supplement No. 1 to the SER.

Since the last SER supplement was issued, several new issues have arisen, and new information has been developed for several issues previously discussed in the SER and its supplements, for which a license condition may be desirable to ensure that staff requirements are met during plant operation. These are listed below. Some of these items must be completed by a fixed date, and some are tied to specific stages of operation, such as exceeding 5 percent of full power.

(1) Inspection requirements. Section 1.12.

(2) Design verification program final report. Section 3.7.4.

(3) Containment tendon surveillance and re-tensioning. Section 3.8.1.

(4) Control room pressurization system modifications. Section 6.4.

(5) Post-accident monitoring instrumentation. Section 7.5.1.

(6) Emergency lighting system. Section 9.5.1.7.

(7) Review of differences from Section 9.5.1 of NUREG-0800. Section 9.5.1.11.

(8) Process control program. Section 11.1.

(9) Purge stack monitors. Section 11.3.

(10) Shift manning. Section 22.2 (I.A.1.3).

(11) Emergency procedures. Section 22.2 (I.C.1).

(12) Pressurizer heater reset procedures. Section 22.2 (II.E.3.1).

(13) Analysis of voiding in reactor coolant system. Section 22.2 (II.K.2.17).

(14) Revised small-break LOCA methods. Section 22.2 (II.K.3.30).

(15) Improved emergency support facilities. Section 22.2 (III.A.2).

1.12 Status of San Onofre 2 Construction and Preoperational Testing

By letter dated February 9, 1982, SCE stated with regard to San Onofre 2 that "plant design and construction are in accordance with the application" and "the unit is ready to enter the fuel loading and low power testing phase of the start-up program."

In addition, the NRC staff has inspected San Onofre 2 and has determined that construction and preoperational testing of the facility have been completed in substantial agreement with docketed commitments and regulatory requirements, with the exceptions noted below. No additional items resulted from the inspection effort that would preclude issuance of an operating license to permit facility operation up to five (5) percent of full power. The items given below will be included in the San Onofre 2 operating license as conditions.

(1) Fire Protection System

Prior to fuel loading, the Southern California Edison Company (SCE) shall complete inspection of all Unit 2 and Common Area fire seals, and shall repair deficient seals or implement compensatory measures as defined in the Technical Specifications.

(2) Post-accident Sampling

Prior to exceeding five (5) percent power, the post-accident sampling system shall be operable and the post-accident sampling program shall be fully implemented.

(3) Surveillance Program

Prior to entering any operational mode for the first time, including initial fuel loading, SCE shall:

a. Have completed a review of the surveillance procedures applicable to the change of mode, and determined that the procedures demonstrate the operability of the required systems with respect to all acceptance criteria defined in the Technical Specifications.

b. Have dispatched written certification to the NRC Regional Administrator, Region V, that the actions defined in a, above, have been completed for the mode or modes to be entered.

(4) Laboratory Instrumentation

Prior to initial entry into operating Mode 2, the laboratory instrumentation described in Sections 11.5.2.2.2 and 12.5.2.2.1 of the Final Safety Analysis Report shall be calibrated and shall be capable of analyzing sample types and geometries necessary to support facility operation. In addition, at that time there shall also be approved, written procedures governing laboratory operations and analyses.

3 DESIGN CRITERIA - STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS

3.7 Seismic Design

3.7.4 Seismic Design Verification Program

The Southern California Edison Company (SCE) has contracted with Torrey Pines Technology, a subsidiary of the General Atomic Company (GA), to perform an independent evaluation of the seismic design and quality assurance program for San Onofre 2 and 3. The GA review has progressed to the point that an interim report, dated January 25, 1982, has been issued. The final report for this effort is scheduled to be issued on March 31, 1982. Our review of the interim report is given below.

(1) Introduction

On December 3, 1981 the Southern California Edison Company formally notified the NRC that they had retained the General Atomic Company to conduct an independent verification of San Onofre Units 2 and 3 seismic design. SCE reported that they took this action to provide greater assurance of the adequacy of San Onofre 2 and 3 design in view of the design problems recently identified at other nuclear facilities.

(2) Background

The design verification encompasses a review of the seismic design of San Onofre 2 and 3 to:

a. verify that the design process converted the seimsic design basis specified in the San Onofre 2 and 3 Final Safety Analysis Report (FSAR) into the design documents that are transmitted to the constructor or fabricator, and

b. evaluate the SCE quality assurance (QA) audit plan and its implementation at the construction site and the fabricator's shops.

The design process performed by the equipment fabricators is not part of this review program.

The work is divided into seven major tasks:

Task A. Design Procedure Review
Task B. Design Procedure Implementation Review
Task C. Seismic Design Technical Review
Task D. Audit Plan Review
Task E. Processing of Findings
Task F. Reports
Task G. Pipe Segment Walkdown

Tasks A through D and G relate to the actual verification process whereas tasks E and F relate to the administrative functions of processing findings and documentation in the interim and final reports.

The review has been structured to concentrate on Unit 2. It includes Unit 3 only in those areas where there are significant differences between Unit 2 and Unit 3.

Two reports are being issued as a result of the review. On January 25, 1982 the first GA report was issued, entitled "INTERIM REPORT, Independent Verification of San Onofre Nuclear Generating Station Units 2 and 3 Seismic Design and Quality Assurance Program Effectiveness." This report makes reference to 58 "potential findings" generated from the verification activity as of January 25, 1981. In addition, supporting information was submited by SCE cover letters of January 29, February 4, February 5, February 11, and February 14, 1982. On January 28 and February 9, 1982, meetings between the NRC staff and GA and SCE were held to review the status and significance of the potential findings and other conclusions provided in the January 25, 1981 Interim Report. These subjects are discussed below. The second and final report is scheduled to be completed March 31, 1982.

In addition to the program plan, its execution, and results, the staff also examined the independence and technical qualifications of the contractor performing the design verification (GA) and the quality controls applied by GA to the administration of the design verification activity.

The review is being conducted by individual GA reviewers investigating each area covered by Tasks A through D, and G. When a reviewer finds a deficiency that may have safety significance, it is documented in a "Potential Finding Report." Potential findings are subdivided into four types:

a. Technical--Includes use of incorrect calculational techniques, nonconservative assumptions, incorrect input values, numerical errors, invalid conclusions.

b. Design Definition--Includes inadequate, inconsistent, or imprecise definition of design requirements, incorrect references or inputs.

c. Traceability--Includes use of undocumented sources of input, unsubstantiated conclusions.

d. Procedural--Includes failing to have or follow adequate procedures.

After the Potential Finding Report (PFR) is written, it is sent to the "original design organization" that was responsible for the area covered by the PFR. The original design organization (ODO) then investigates the PFR and responds in writing. The PFR and the ODO response are then reviewed by a GA committee, and the PFR is classified as (1) Out of scope, (2) Invalid, (3) Observation, or (4) Finding.

Out of scope items are those which are beyond the original scope of the review. For example, the review is oriented towards design verification. Procurement items are considered out of scope. Invalid items are the result of apparent deviations, uncovered in the course of the independent verification, that are resolved to the satisfaction of project personnel, usually during the Potential Finding review by the Original Design Organizations. Observations are actual deviations but because of their nature are judged not to have the potential for significant impact on the seismic design adequacy of San Onofre Units 2 and 3. Findings are actual deviations that could have potential for significant impact on the seismic design adequacy.

Observations and Findings are sent to the Executive Vice-President of SCE for resolution. In the case of Findings, a Corrective Action Plan (CAP) is prepared and returned for review. The review will determine if the CAP satisfies the concern expressed in the Findings. A total of 58 PFR's were found during the time period covered by the interim report. Five of these were classified as Findings. These are PRF numbers 0009, 0034, 0038, 0047, and 0052. A sixth, PFR 0051, was originally classified as a Finding, but was subsequently reclassified an Observation. The NRC staff review has been concentrated on the Findings discovered during the period covered by the interim report.

(3) Independence of the Design Verification Contractor

The staff reviewed the independence of the design verification contractor (General Atomic Company). The objective of the staff review was to determine whether or not the contractor could be expected to provide an objective, dispassionate technical judgment, provided solely on the basis of technical merit. The following factors were considered in this determination:

a. The extent of the previous or current involvement of GA and the GA reviewers with Southern California Edison Company or San Diego Gas and Electric Company.

b. Whether the GA reviewers own or control significant amounts of stock in SCE or SDG&E.

c. Whether members of the present household of the GA reviewers are employed by SCE and SDG&E.

d. The administrative controls implemented at GA to assure that an auditable record will be provided of all comments on draft or final reports, any changes made as a result of such comments, and the reasons for such changes; or the consultant will issue only a report without prior SCE comment.

Correspondence provided by General Atomic and Southern California Edison to the NRC staff demonstrated that recent contracts (within the last two years) between GA and the applicants, Bechtel Power Corporation (BPC), and Combustion Engineering Inc. (CE), account for less than 3% of GA revenue. The staff considers this value low enough to assure corporate financial independence.

In reference to the independence of individuals the contractor (GA) has established the following criteria:

a. Key project personnel shall have no present or past work experience in design, construction or quality assurance of the San Onofre Nuclear Generating Station (SONGS) or with Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E).

b. Project personnel shall not be active on any other current SONGS, SCE, or SDG&E work.

c. Project personnel, other than the key personnel, shall not have any substantial prior work experience relating directly to SONGS, particularly in the areas of quality assurance and structural analysis.

d. No project personnel shall have members of their immediate family (parents, spouse, children and grandchildren) who are employed by SCE or SDG&E or are engaged directly or indirectly in the design or construction of SONGS.

e. During the term of this project no project personnel and their immediate family shall have cumulative ownership interest in SCE and SDG&E which exceeds 5% of their gross family annual income.

The staff concludes that the implementation of these crieria is adequate to assure sufficient individual independence. The implementation of the criteria was evaluated by a staff review of a sample of the contractor's personnel/security questionnaries and confidential interviews with a selected number of the contractor's employees. In all cases it was found that the individuals met the independence criteria established by the contractor.

The staff examined the contractor's administrative controls implemented to assure that auditable records are maintained for all information related to review findings and reports transmitted between the contractor and the applicants/Bechtel/Combustion Engineering. These controls are considered to provide adequate assurance that the contractor's independence is not compromised.

In summary, for the reasons given above, the staff concludes that the selected contractor, GA, has adequately demonstrated both corporate and individual independence.

(4) Technical Qualifications of the Design Vertification Contractor

The staff also reviewed the technical qualifications of the design verification contractor (GA) The objective of the staff review was to determine whether or not the contractor could be expected to provide the depth and scope of technical review necessary to probe the significant elements of the seismic design developed for San Onofre 2 and 3 and to develop conclusions as to the adequacy of that design based on sound engineering principles and practice. In making this determination, the

staff considered both the infrastructure of the contractor's organization and the qualifications of the assigned staff.

The infrastructure necessary to assure coordination and integration of engineering disciplines necessary for the verification program is provided by Torrey Pines Technology, a division of GA. GA has carried out numerous engineering design projects for major nuclear systems and structures. These projects have involved designs to meet the requirements of national structural and mechanical engineering codes as well as NRC regulatory practices. The GA experience includes the full range of activity necessary for seismic design. This covers the range from development of mathematical models to characterize structures and components to the detailed design of components and specification of test programs for equipment. The staff concludes that this breadth and depth of experience demonstrates that GA is qualified to conduct the verification program.

Qualifications of the professional staff assigned to the verification program have been reviewed on the basis of individual resumes and by observation and interview of some GA staff members.

The individual resumes show that all the assigned GA staff members hold degrees in mechanical and structural engineering; and a majority hold advanced degrees in the engineering specialties associated with seismic design. The résumés of the quality assurance personnal show that they have extensive and applicable background and experience.

During the period January 6 through January 8, 1982, representatives of the staff and a staff consultant met with SCE and GA to discuss the scope and the progress of the verification program. Staff engineers and our consultant observed the GA professional staff at work on the verification program. We discussed with the GA engineers their approach to typical aspects of the program. This included the methods the GA engineers would use to develop and examine the information they felt would be necessary to reach a conclusion regarding the adequacy of the seismic design (for San Onofre 2 and 3) and the criteria they would apply in reaching those conclusions.

Based on the credentials shown by the resumes and the observations made at GA , the staff concludes that the professional personnel assigned to the verification program have qualifications and expertise adequate to perform their assigned duties.

(5) Quality Assurance Program Implementation for Design Verification Activities

The contractor, in its proposal to the applicants, agreed to conduct the design verification in accordance with the NRC approved General Atomic Quality Assurance Program, Topical Report No. GA-A13010A, Amendment 6. The staff reviewed the design verification contract documents, program plan, and implementing contractor procedures and determined that these documents provided sufficient controls to assure the design verification would be conducted substantially in accordance with the approved Topical Report. Implementation of the procedures and other pertinent requirements was examined during a staff visit to the GA offices during the period of

January 6 through 8, 1982. The staff representatives found that, for those areas examined, activities were being performed in accordance with the established quality and procedural controls. The staff, therefore, concludes that adequate quality measures have been implemented for the design verification activity.

(6) Task A, "Design Procedure Review"

As a result of work performed under Task A, "Design Procedure Review," a total of four Findings resulted. These involved questions concerning the proper formulation of quality assurance controls. The criteria utilized by GA to determine the acceptability of the quality assurance (QA) program controls are Appendix B to 10 CFR 50 and the commitments contained in the PSAR for San Onofre 2 and 3 at the CP stage of review. These four Findings are summarized as follows:

PFR-0034 - SCE's procedures for conducting QA audits did not specify that assessment of the QA program effectiveness should also be performed as required by Appendix B to 10 CFR 50. GA categorized this Finding under Task D, but the staff believes it more properly belongs under Task A.

PFR-0038 - A Combustion Engineering (CE) procedure governing the project manager's responsibilities for controlling the distribution of documents within CE and to and from outside organizations did not exist as required by Appendix B to 10 CFR 50 and the PSAR.

PFR-0047 - QA procedures for CE did not include provisions for other design reviews and analysis by the Safety and Licensing Department, Nuclear Safety Committee, Chief Scientist, and a management committee/task force as specified in the PSAR.

PFR-0052 - A CE procedure governing the project manager's responsibility to monitor design, to check conformance to design specifications and licensing requirements, and to check compatibility of design with the A/E interfaces did not exist.

These Findings indicate potential weaknesses in the formulation of the QA program by CE for San Onofre 2 and 3. However, responses received from the original design organizations state that the necessary activities were indeed performed. In a telephone discussion between SCE, GA, and NRC staff personnel on February 12, 1982, GA stated that:

PFR-0034 - Since the identification of this finding, GA personnel have conducted reviews of SCE's Corrective Action Plan and audit reports under Task B of the verification program and determined that the SCE audits did assess the adequacy of QA controls in addition to an evaluation of compliance or non-compliance to specific requirements. An evaluation of the effectiveness of the QA program was performed by SCE during their audits even though such an objective was not specifically included in the audit procedure. The GA review of this item is therefore complete.

PFR-0038/0047/0052 - Since the identification of these findings, GA personnel have further determined that CE has available a series of "road

maps" that establish the design sequence in detail for each safety-related item of equipment. These maps identify all internal and external interfaces. Three of these maps have been reviewed by GA and they indicate proper concern for interface controls. Others will be reviewed under Task B of the design verification program.

In addition, GA personnel have determined through review of SCE audit reports that the functions identified in Findings 0038/0047/0052 were indeed carried out. Other evidence of conformance to requirements was noted in minutes of interface meetings and letters involving the SCE, BPC, and CE engineering organizations. Under Task B, "Design Procedures Implementation Review," GA will review the involved project documents to determine whether or not implementation was properly accomplished. This effort is scheduled for completion by early March 1982.

The above information was initially received by telephone on February 12, 1982, and was documented as supplementary information by letter, G. Wessman, GA Project Manager to D.J. Fogarty, Executive Vice President of SCE, dated February 14, 1982.

Since 1975, the NRC staff has conducted 22 inspections of CE to assess implementation of CE's QA program in all functional areas subject to 10 CFR 50, Appendix B, including design interfaces, design verification, and design document control. Based on these inspections and CE's actions regarding resolution of identified problems and evaluation of the procedures and instructions established to satisfy commitments contained in the CE topical report CEND-210-A, the staff has concluded that there have not been any non-conformance or unresolved items relating to design interfaces, design verification or design document control for which timely and effective corrective and preventive actions were not taken. To further support this conclusion, the staff reissued a letter to CE on June 1, 1981 confirming satisfactory quality assurance program implementation.

Based on the efforts conducted to date under Task A of the design verification program by GA, the evaluation of the SCE audit reports by GA, and the results of the NRC staff inspections of CE, it is concluded that the quality assurance programs established and implemented by SCE, BPC, and CE effectively controlled the seismic design activities for San Onofre 2 and 3. Additional efforts are planned under Task B of the design verification program to provide further assurance of proper QA program implementation. The results of efforts performed to date provide an acceptable basis for authorizing fuel loading and operation of San Onofre 2 up to 5 percent of full power.

(7) Task B, "Design Procedure Implementation Review"

Contractor activity related to this task has progressed only to the preparatory stage as of January 25, 1981. Staff review of this activity will be performed at a later date after a sufficient amount of activity has taken place.

(8) Task C, " eismic Design Technical Review

The objective of this task is to review the seismic design of selected safety-related structures, systems, and components for compliance with the design bases and methodology contained in the FSAR for San Onofre 2 and 3. A general description of the task is given in "Program Plan -Independent Verification of SONGS 2 and 3 Seismic Design," December 1981, by Torrey Pines Technology, a Division of General Atomic Company (GA).

At the time the interim report was published, the following work had been completed:

a. Seismic design chain networks (or seismic interface charts) for nine safety-related systems have been developed. These networks identify the seismic-related design process and flow-of-interface information and design organizations responsible for the design activity, including major subcontractors. These networks are use in conjunction with the selection plan for identifying the features to be reviewed.

b. The selection plan for use in choosing the features to be reviewed has been completed. These features are plant structures, systems, segments of systems, components, and other equipment.

c. Twenty-two features of San Onofre 2 and 3 have been identified in accordance with the selection plan and seismic design chain networks as the subject of the seismic technical design review. Ten of these features are included in the safety injection system (SIS).

d. The procedure for use in performing the detailed seismic design review has been prepared. This procedure is based on the design review approach for design verification as approved in ANSI N45.2.11 - 1974, Section 6.3.1. Independent calculations are used as a supplement.

The scope of the design review for the interim report was limited to features in a segment of the SIS, the primary safety system selected as the focus of the initial review. Features reviewed include:

- Refueling water storage tank.
- Low pressure safety injection pump.
- Safety injection tank.
- Major piping.
- Small bore piping.
- Pipe supports and snubbers.
- Valves.
- Instruments, racks, and panels.
- Switchgear and power panels.
- Electrical and control cables.

The NRC staff examined the contractor's activity related to this task during a meeting at the GA facilities on January 6 through 8, 1982, and during meetings in Bethesda, Md. on January 28 and February 9, 1982. In the course of this review, the staff considered the following factors for each PFR:

a. Clarity of the problem statement.
b. Quality and technical depth of the response by the ODO.
c. Accuracy and appropriateness of the contractor's Impact Assessment.
d. Basis and appropriateness of the contractor's disposition.

Based on this review, the staff concludes that Task C is being performed in accordance with the design verification program plan and that this activity provides additional assurance that the San Onofre 2 and 3 seismic design was conducted by SCE and BPC in accord with acceptable practices.

Several PFRs resulting from Task C were subsequently classed as Observations when the contractor determined that an error had occurred, but the incident appeared to be isolated and the impact on seismic capacity negligible. The staff has requested and GA has agreed to catalogue these PFRs according to their discipline, severity, impact assessment and disposition in order to facilitate the examination of these issues for trends that could indicate systematic errors in the design process.

At the present time, two possible trends have been considered to date (Letters dated February 10, 1982 and February 14, 1982, G.L. Wessman, GA, to D.S. Fogarty, SCE). The first pertains to the development of a systematic program for tracking differences between Units 2 and 3, particularly for piping. This matter is of particular significance for Unit 3 and the contractor reports that review of a punch list system and planned walkdown program for Unit 3 may resolve the question.

A second possible trend concerns the lack of consistency in the labeling of piping node points in pipe support drawings, stress isometric drawings and computer programs. The contractor reports that design deficiencies have not been identified; a coordinate system was used rather than node point numbers to obtain consistent locations. However, procedurally, the consistent node point labeling would appear the preferred practice.

The staff concludes that neither of these possible trends indicates a significant safety concern at this time.

Two Findings initially resulted from Task C. These were PFR 0009 and PFR 0051. PFR-0009 deals with methodology for design of cable raceway supports and PFR-0051 concerns qualification levels for some motor-operated valves.

PFR-0009 concerns the methodology employed for the analysis of those cable tray supports which are mounted at an angle, i.e., not either vertical or horizontal. Such angle supports were found to have been analyzed based on one component of load whereas both the horizontal and vertical components should be considered. In a further report on this matter the contractor states that, in a sample of 15 angle supports, one was found to exceed the design load based on the assumption that all cable trays were carrying the maximum allowable load. Based on this sample, it appears unlikely that this Finding will result in significant reduction of the seismic capacity of cable trays. The staff concludes that the matter should be resolved prior to completion of the design verification program, and any necessary modifications accomplished in an orderly fashion to assure that all

intended margins are restored but that the impact on safety appears to be neglible.

PFR-0051 was first issued to highlight an apparent inconsistency in qualification levels of motor-operated valves supplied by Combustion Engineering (CE) and valves supplied by BPC. Further review of engineering specifications demonstrated that the CE valves were provided to specified qualification levels; however, this further review did discover an inconsistency in the methods employed by BPC to calculate the acceleration levels appropriate for higher frequency responses of the valves. The contractor has reported that the methods employed by BPC provide a range of conservatism. Application of the most conservative method to a sample of eight valves led to the conclusion that the acceleration level at one of those valves would exceed the specified qualification level. The probable solution would be adjustment of the piping supports to restore the calculated acceleration level to the qualification values.

It appears unlikely that these deviations from design conditions have a significant impact on safety in light of the large design margins employed in motor-operated valves. However, the staff will require that this matter be followed through to a final conclusion for all of the valves supplied by CE and that calculated accelerations be brought below qualification levels before operation at greater than 5% power. In the letter of February 14, 1982, GA has reclassified this item an Observation, based on further evaluation of its significance.

(9) Task D "Audit Plan Review."

The objective of this task is to review and evaluate the QA audit plans of SCE and Bechtel Power Corporation (BPC), the San Onofre 2 and 3 engineer-constructor, and to verify implementation of those plans. The review and evaluation has been restricted to audit plans and audits covering implementation of seismic design output (i.e., drawings and specifications) at the construction site or the fabricator's shops.

The contractor (GA) has concluded that SCE and BPC procedural requirements for audit planning and scheduling were consistent with regulatory requirements, except for the lack of SCE procedural requirement in response to one part of the regulatory requirements. This item is identified as a "Finding" (PFR No. 0034). The contractor also concludes that SCE and BPC audit plans and schedules were prepared as required by SCE and BPC procedures, and that the schedules did include site and suppliers (fabricator shop) audits covering implementation of seismic design output. The contractor's review of audit reports was also discussed in the GA letters of February 10 and February 14, 1982.

The staff review of the contractor's activity related to this task was examined during a visit to the contractor's facilities on January 6 through 8, 1982 and during meetings on January 28, 1982 and February 9, 1982. Based on the review, the staff concludes that the contractor's activity on this task was performed in accordance with the program plan and that this activity provides additional assurance that SCE's and BPC's audit program was properly implemented. The one finding associated with

this task thus far (PFR No. 0034) describes the condition that one SCE audit procedure did not specify "assessment of effectiveness of the quality assurance program" as an audit objective. In response to this finding SCE established that the SCE QA manual for San Onofre 2 and 3 specifies that audits are used to verify overall effectiveness of the QA program, and identifies how audits as well as other management controls are used to assess the effectiveness of the QA program. The staff considers that SCE audits, as well as other controls, have been used to assess the effectiveness of the QA program even though the one SCE procedure does not specifically indicate "assessment of effectiveness" as an audit objective. The finding is not considered to be a substantial quality or safety issue.

(10) Task E, Processing of Findings

This is an administrative task and was not reviewed by the staff. A discussion of this area is given above, under (2) Background.

(11) Task F, Reports

This is an administrative task and was not reviewed by the staff.

(12) Task G, Pipe Segment Walkdown

The objective of this task is to verify, to the extent possible by visual examination, the proper installation of portions of a particular piping run that had been reviewed in Task C.

For the interim report, the contractor has examined a sample of approximately 300 feet of piping and associated components in the Safety Injection System (SIS) at San Onofre 2. This effort included a field audit of four stress isometric drawings and 12 pipe support drawings.

The contractor concluded that the piping was routed as designed, and that the type of seismic restraints in place are as intended on the design drawings. Deviations in support locations and some details of the support configuration were noted. However, none of these matters has been classed as a Finding.

The staff has reviewed the original PFRs developed as a result of the walkdown, the ODO responses, and the disposition of the PFRs. Based on this review, the staff concludes that Task G is being carried out in accord with the program plan and that this effort provides additional assurance that the installation of piping systems was consistent with the design analyses for San Onofre Unit 2.

(13) Conclusions Regarding Design Verification Program

On the basis of the staff review described above, we conclude that the contractor, GA, is acceptably independent, has an acceptable degree of technical qualifications, and has implemented an acceptable QA program for the conduct of the design verification program. The staff also concludes that the design verification program is acceptably designed and

implemented to uncover systematic design deficiencies that may exist in the seismic design of San Onofre 2 and 3.

The staff review of the interim results of the design verification program leads us to conclude that the GA design verification program has not discovered anything that would cause us to change our previous conclusions that the San Onofre 2 and 3 quality assurance and seismic design are acceptable. To assure timely completion of the GA effort, we will condition the San Onofre 2 operating license to require completion of the program and issuance of a final report, acceptable to the NRC staff, prior to exceeding five percent power.

3.8 Design of Category I Structures

3.8.1 Concrete Containment

In the SER we stated that the applicants had indicated that the tendon surveillance program would be consistent with the recommendations of Regulatory Guide 1.35 (Revision 3) and Regulatory Guide 1.35.1 (Revision 1). Since the SER was issued, the applicants submitted a proposed tendon surveillance technical specification for our review. Upon review of this material, we concluded that the proposed tendon surveillance program is not in complete accordance with the recommendations of the above Regulatory Guides. The apparent deviation is that the applicants determined the predicted losses of the initial prestress on the basis of the average of ten vertical and horizontal tendons selected from each tendon group for the surveillance. The Regulatory Guides recommend that when a tendon is selected randomly during an inspection from a group of tendons, its lift-off value should be checked to see if it is within the predicted tolerance band for that tendon. Furthermore, the Guides recommend that over the 40-year life of the plant, the predicted prestressing force, considering high time-dependent losses in any tendon selected for surveillance and allowing for the expected breakage, should not fall below the required design prestressing force at an anchorage.

The information provided by the applicants indicates that this requirement is satisfied when the calculations are performed on the basis of the average of the ten tendons selected for surveillance but not when the forces and losses are considered for the individual tendons. The time at which the effective anchor force of a randomly selected tendon may fall below that required by design was estimated to occur about six years after the Initial Structural Integrity Test. This does not conform to the staff position as described above and, therefore, is not acceptable.

Since the deviation from the recommendations of the Regulatory Guides will not occur for six years, we will condition the San Onofre 2 operating license to require that within three years of the date of issuance of the license the applicants shall develop and submit for NRC staff review and acceptance (and implement, as necessary), a tendon surveillance test program which will ensure full conformance with the provisions of Regulatory Guide 1.35 and Regulatory Guide 1.35.1. This tendon surveillance program shall include a specific program and commitments for re-tensioning of the tendons, such that the predicted prestressing force of each tendon will be greater than the required design prestressing force of the tendon for the entire plant life.

5 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

5.4 Component and Subsystem Design

5.4.3 Shutdown Cooling System (Residual Heat Removal System)

In a meeting to discuss the Palo Verde and CESSAR applications, the Advisory Committee on Reactor Safeguards (ACRS) expressed concern (see ACRS letter of December 15, 1981) over the need for a reliable heat removal capability in view of the lack of a direct means to rapidly depressurize the primary system. The CESSAR and Palo Verde designs do not include power operated relief valves (PORVs) to permit the feed and bleed method of cooling the way it is provided in other PWRs. Neither do other recent Combustion Engineering NSSS designs, such as San Onofre 2 and 3.

Also, the Ginna steam generator tube rupture incident of January 25, 1982 has resulted in renewed consideration being given to the possibility of simultaneous steam generator tube ruptures in both steam generators. We are also reconsidering accident scenarios that could lead to simultaneous loss of coolant in the primary and secondary systems. These considerations require us to reexamine the possibility of feed and bleed as an alternate method of providing core cooling. We are also interested in the use of the PORV to gain control of primary system pressure to avoid challenges to the safety valves on a faulted steam generator, thereby reducing the frequency of releases of radioactivity following steam generator tube ruptures.

In addition, we have recently been provided with new information by the NRC Office of Nuclear Regulatory Research. The new information is in a memorandum on Combustion Engineering (CE) system reliablity that bases its analysis on the Accident Sequence Precursor Program. The techniques used in this program are somewhat controversial, and we are currently reviewing both the techniques and conclusions. The memorandum concerns the feed and bleed issue for CE reactor designs without PORVs. It makes two conclusions concerning the reliability of the auxiliary feedwater system which are at variance with the conclusions in the San Onofre 2 and 3 SER and SER supplements. We have these differences under review.

In view of the concerns discussed above we have evaluated the potential consequences of operation of San Onofre 2 at low power for the purpose of startup testing. We conclude that the risk of such operation is negligible because even if feedwater were lost to one steam generator, boiling of the remaining steam generator inventory and heat transfer to the containment atmosphere and structures would be sufficient to prevent overheating of the core.

Should a steam generator tube rupture event occur during this low power testing period, three factors would contribute to substantially reducing the risk to the public. First, there is sufficient time available for the operators to correct the loss of important safety systems needed to mitigate the event or to take alternate courses of action. Second, the fission product inventory during low power operation is very much less than during full power operation. Third, there is a reduction in required capacity for mitigating systems at low power.

This issue is being studied on a generic basis with Combustion Engineering.

We will report on the resolution of this issue in a future supplement to the SER, prior to issuance of a full power license for San Onofre 2.

6 ENGINEERED SAFETY FEATURES

6.4 Control Room Habitability Systems

In the SER the staff completed its review of San Onofre 2 and 3 control room habitability. The review was conducted in accordance with Standard Review Plan (SRP) Section 6.4 and Item III.D.3.4 of NUREG-0737 and there were no open items.

Subsequently, the applicants conducted air tests to demonstrate the effectiveness of the control room pressurization system. The tests were to show that the control room could be pressurized to 1/8" water gauge as the applicants had committed. After conducting the tests, the applicants concluded that the present system could not achieve the 1/8" water gauge pressure and that it was necessary to make modifications to the ventilation system design. The air tests did, however, demonstrate the present system could pressurize the control room to 0.04" water gauge.

The staff and the applicants met on January 21, 1982 in Bethesda to discuss the applicants' proposed changes and the schedule for those modifications. The applicants provided justification for operation during the period that modifications were to be made and formally submitted documentation on these changes in a submittal dated January 27, 1982. The applicants indicated that the control room modifications would be in place by August 1, 1982. The modifications would permit the control room to be pressurized to 1/8" water gauge. The applicants stated that the modifications could not be accomplished prior to August 1, 1982.

The staff has reviewed the material submitted by the applicants and has found the analysis to be conservative. Calculated radiation doses are less than the General Design Criterion 19 guideline values and the chlorine analysis shows acceptable concentration limits without taking credit for cleanup by the control room recirculation charcoal filters.

Because the present system has been demonstrated to provide positive pressurization, which will provide substantial protection against both toxic gases and airborne radiation, and the applicants have committed to bringing this pressure up to 1/8" water gauge by the installation of: (1) seismically qualified low leakage dampers on the normal ventilation system ducts; and (2) a larger seismically qualified safety-grade ventilation system fan motor, the staff concludes that operation until the modifications are completed (August 1, 1982) is acceptable. The San Onofre 2 operating license will be conditioned to require that the modifications specified above shall be in place by August 1, 1982 and that with these modifications in place the applicants shall demonstrate that the control room can be pressurized to 1/8" water gauge. Finally, we will require in the plant Technical Specifications that the control room pressurization system be periodically tested every eighteen months.

7 INSTRUMENTATION AND CONTROLS

7.2 Reactor Protection System

7.2.4 Bypass of a Plant Protection System Trip Channel

In the SER we stated that based on our review described therein, we concluded that it would be acceptable for San Onofre 2 and 3 to operate with a plant protection system trip channel in bypass, because such operation, under the conditions discussed, meets all the applicable acceptance criteria. Since the SER was issued, further review indicated the possibility that a single failure (fault, surge) within a common vital bus coincident with the bypass of a parameter of a specific channel could defeat the required protective function of the protection system. The staff decided not to allow San Onofre 2 and 3 to operate with the proposed technical specifications until the applicants had verified that the above described failure mode could not occur within the San Onofre 2 and 3 logic matrix power supply design.

As a result, the applicants were requested to provide technical justification to demonstrate that faults, surges, and other failures within a vital bus supplying power to the matrix power supply will not prevent protection system actuation when one channel is bypassed.

In response to our request, the applicants briefly described fault and surge testing applicable to the San Onofre 2 and 3 plant protection system (PPS) logic matrix circuitry. As a result of the testing the following was observed:

(1) There were no effects observed on the test load with either surge wave forms or with the 140-volt DC fault applied to the test circuit.

(2) With the 508-volt AC fault applied to the test circuit, the wave form across the test lead was observed to be a spike train superimposed on the nominal 12-volt DC level. The peak amplitude of the spike train followed an exponential envelope which rushed to a maximum value of 41 volts DC and subsequently decayed to a steady state value of 12 volts DC.

Based on the above results, an analysis was performed by Combustion Engineering to assess the effects of applying the surge and fault voltages to the PPS logic matrix circuitry. The results of the analysis showed that the effects which resulted from the above stated spike train (41 volts DC) would not prevent the normal tripping action of the PPS under fault or surge conditions.

Based on our review of the results of the analysis performed by Combustion Engineering, we conclude that there is reasonable assurance that a single failure within a common vital bus supplying power to the matrix power supplies coincident with the bypass of a parameter of a specific channel will not prevent the required protective action of the PPS. Therefore, San Onofre 2 and 3 will be allowed to operate with one PPS trip channel in bypass under the conditions specified in the SER.

7.5 Safety-Related Display Instrumentation

7.5.1 Post-Accident Monitoring Instrumentation

In the SER, we stated that the applicants meet the requirements of Regulatory Guide 1.97, Revision 1, "Instrumentation for Light-Water-Cooled Nuclear Power Plants, to Assess Plant Conditions During and Following an Accident." Since that time, Revision 2 of the guide has been issued. Because Revision 2 represents current staff recommendations in this area, we will condition the San Onofre 2 operating license to require that the applicants submit a proposal, including an implementation schedule, for meeting Revision 2 of Regulatory Guide 1.97. In the interim, compliance with Revision 1 is an acceptable basis for plant operation.

9 AUXILIARY SYSTEMS

9.5 Other Auxiliary Systems

9.5.1 Fire Protection System

9.5.1.7 Emergency Lighting

In the SER we stated that 8-hour battery pack emergency lights are required for areas of the plant necessary for safe shutdown. After the SER was issued, the applicants indicated that they planned to use portable hand held lights, rather than fixed emergency lights in access and egress routes to safe shutdown areas. After discussions with the staff, the applicants agreed, by letter dated January 27, 1982, to install fixed emergency lighting (sealed beam units with 8-hour minimum battery power supplies) in access and egress routes to safe shutdown areas. The fixed lighting will be installed in San Onofre 2 prior to exceeding 5 percent power. We will condition the San Onofre 2 operating license to require that this schedule be met. In the interim, plant operation is acceptable because of the reduced risk associated with operation at low power and because of the availability of portable lights.

9.5.1.11 Appendix R Statement

In the SER we stated that based on the applicants' commitments to modify the facility, we believed that the San Onofre 2 and 3 fire protection system will meet the requirements of Appendix R to 10 CFR 50 when the committed modifications had been completed. However, since Appendix R did not apply to San Onofre 2 and 3 at the time our fire protection review was conducted, we did not require the applicants to specifically evaluate all aspects of the fire protection system for compliance with Appendix R. Since that time, our fire protection criteria have been delineated in NUREG-0800 (the Standard Review Plan), Section 9.5.1, which references Appendix R. We will condition the San Onofre 2 operating license to require the applicants to submit an evaluation of the plant against the criteria of Section 9.5.1 of NUREG-0800 prior to exceeding 5 percent power. In the interim, plant operation is acceptable because of the reduced risk associated with operation at low power, and because the staff's audit review described in the SER indicated compliance with Appendix R or an equivalent level of protection.

11 RADIOACTIVE WASTE SYSTEM

11.1 Summary Description

In Section 11 of the SER, repeated mention was made of the UF radwaste solidification system that was, at that time, planned for use at San Onofre 2 and 3. After the staff review of Section 11 was complete, the applicants stated that the UF system will be totally isolated and will not be used for solidification. Until a new system is installed, a Chem. Nuclear Inc. solidification process, per NUREG-0472, will be used, with cement as the solidifcation system.

The process control program for this system was submitted for NRC staff review by letter dated January 29, 1982. Until the staff has reviewed and approved the program, we will prohibit shipment of "wet" solid waste from the facility. This will be accomplished by a condition in the San Onofre 2 operating license.

11.3 Process and Effluent Monitoring System

In the FSAR the applicants committed to monitor and sample the containment purge exhaust, which is a separate release pathway at San Onofre 2 and 3. However, by letter dated February 3, 1982, the applicants propose to utilize the containment atmosphere monitoring system rather than provide a monitoring system directly on the purge lines.

Based on our review of the applicants' submittal, we have concluded that the proposed capability to monitor and sample the effluent via the containment purge should be enhanced to provide the capability for continuous monitoring and sampling of the containment purge exhaust directly from the purge stack for the low and high volume containment purge systems. Consequently, we will condition the San Onofre 2 operating license to require this capability after the first refueling outage.

Until that time, the applicants propose to use either of the containment airborne monitors 2RT-7804-1 or 2RT-7807-2 and the associated sampling media for continuous monitoring and sampling the purge exhaust of Unit 2. We find this is acceptable until initial criticality; thereafter, prior to startup following the first refueling outage, the applicants' proposal to use the airborne monitor 2RT-7804-1 for the above mentioned purpose is acceptable for the following reasons:

(1) No release of radioactivity to the environment via the containment purge system is expected prior to initial criticality, since there will be no buildup of fission products in the fuel prior to initial criticality. In the unlikely event of a criticality accident during initial fuel loading, the containment will be isolated.

(2) Extensive mixing of the containment atmosphere by the normal HVAC units is expected to ensure that the containment atmosphere is somewhat representative of the effluent stream during the high volume purging.

(3) Technical specifications for plant operation will preclude operation of the low volume purge for more than 1000 hours a year. Since the airborne monitor RT-7804-1 and the associated sampling media are in the vicinity of the low volume purge intake, the containment atmosphere will be representative of the effluent stream during the low volume purging.

22 TMI-2 REQUIREMENTS

22.2 Discussion of Requirements

In Supplement No. 4 to the SER, we discussed the applicants' request for relief from the requirements of five dated items from NUREG-0737, "Clarification of TMI Action Plan Requirements." By letter dated January 27, 1982, the applicants identified two additional NUREG-0737 items for which schedular relief was being requested. These are I.C.1, "Guidance for the Evaluation and Development of Procedures for Transients and Accidents," and II.K.2.17, "Potential for Voiding in the Reactor Coolant System During Transients." By letters dated February 9 and February 11, 1982, the applicants requested additional relief from the schedule requirements of II.K.2.17, and from II.K.3.30 and III.A.2. In addition, recent discussions with the NRC Resident Inspector at San Onofre 2 have indicated that certain requirements of item II.E.3.1, "Emergency Power Supply for Pressurizer Heaters," are not met at this time. These NUREG-0737 items have been discussed with the applicants and they have provided justification for temporary relief from the schedular requirements of each item. Our evaluation of these items is given below. Also discussed below is the revised NRC overtime policy, Item I.A.1.3.

I.A.1.3 Shift Manning

In Supplement No. 1 to the SER, the NRC staff described guidelines for overtime use of plant operating personnel. Since that time, the NRC guidelines have been modified. The present position is given below. We will include a condition in the San Onofre 2 license requiring that the revised guidelines be met, except under the circumstances defined below. We have evaluated the San Onofre mangement structure and have determined that an equivalent level of management review will be achieved if the "plant manager or his deputy" specified below is changed to "station manager, his deputy, or the operations manager."

(1) NRC policy on overtime

Licensees of operating plants and applicants for operating licenses shall establish controls to prevent situations where fatigue could reduce the ability of operating personnel to keep the reactor in a safe condition. The controls should focus on shift staffing and the use of overtime--key job-related factors that influence fatigue.

The objective of the controls would be to assure that, to the extent practiable, personnel are not assigned to shift duties while in a fatigued condition that could significantly reduce their mental alertness or their decision-making capability. The controls shall apply to the plant staff who perform safety-related functions (e.g., senior reactor operators, reactor operators, health physicists, auxiliary operators, and key maintenance personnel).

Enough plant operating personnel should be employed to maintain adequate shift coverage without routine heavy use of overtime. However, in the

event that unforeseen problems require substantial amounts of overtime to be used, on a temporary basis, the following guidelines shall be followed:

a. An individual should not be permitted to work more than 16 hours straight (excluding shift turnover time).

b. An individual should not be permitted to work more than 16 hous in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any seven-day period (all excluding shift turnover time).

c. A break of at least eight hours should be allowed between work periods (including shift turnover time).

d. The use of overtime should be considered on an individual basis and not for the entire staff on a shift.

Recognizing that very unusual circumstances may arise requiring deviation from the above guidelines, such deviation shall be authorized by the plant manager or his deputy, or higher levels of management. The paramount consideration in such authorization shall be that significant reductions in the effectiveness of operating personnel would be highly unlikely.

In addition, procedures are encouraged that would allow licensed operators at the controls to be periodically relieved and assigned to other duties away from the control board during their tour of duty, consistent with the shift manning requirements of the Technical Specifications.

The Technical Specifications require two senior reactor operators (SROs) in the control room for many operating modes. The planned number of shifts, five, thus would require ten SROs for San Onofre 2. In October 1981, two San Onofre 2 SRO candidates passed the SRO exams. The candidates participated in a retraining program reviewed by the NRC staff, and 13 SRO candidates took the SRO exam in January 1982. Of these, 12 passed, making a total of 14 qualified SROs for San Onofre 2. Since only 10 are required, we conclude that shift staffing of senior reactor operators is adequate for operation of San Onofre 2.

I.C.1 Guidance for the Evaluation and Development of Procedures for Accidents and Transients

In response to NUREG-0737, Item I.C.1, the applicants agreed to incorporate NRC approved guidelines, as necessary, into the San Onofre 2 and 3 emergency procedures and to implement these revised procedures at the first refueling outage after June 1, 1982. This commitment was predicated on San Onofre 2 receiving its operating license prior to January 1, 1982. For plants licensed after January 1, 1982, NUREG-0737 states that emergency operating procedures based on a reanalysis of transients and accidents are required to be implemented prior to operation.

San Onofre 2 did not receive an operating license before January 1, 1982, and since no approved guidelines have yet resulted from the Combustion Engineering (CE) Owners' Group efforts in regard to Item I.C.1, the applicants will be unable to comply with the NUREG-0737 requirement to implement revised

procedures prior to operation. The existing San Onofre 2 emergency procedures were written using interim guidelines provided by CE. These procedures incorporated comments resulting from CE review and the NRC pilot monitoring program associated with NUREG-0660 Item I.C.8. The NRC staff has reviewed these procedures and considers them to be acceptable for interim operation of San Onofre 2 because they provide adequate guidance to plant operators to enable them to cope with emergencies pending development of final procedures.

The applicants committed in a letter dated January 27, 1982 to upgrade the emergency operating procedures at the first refueling outage after January 1, 1983, based on upgraded guidelines to be provided by CE. This schedule is acceptable to the NRC staff for meeting the long-term requirements of NUREG-0737, Item I.C.1, because in the interim, the existing procedures are adequate, as discussed above.

II.E.3.1 Emergency Power Supply for Pressurizer Heater

The pressurizer heaters are automatically shed from the Class 1E power system upon the occurrence of a safety injection actuation signal (SIAS). The reset capability and the manual controls for the pressurizer heater feeder breakers are located in the control room. Procedures for manually loading the pressurizer heaters onto the emergency power sources following an SIAS will be available to the operator.

However, if the heater mode switch is in the automatic position, the heaters will be reenergized automatically when the SIAS signal is reset. This is not in conformance with our position which only permits non-Class IE loads to be manually reapplied to Class 1E buses after a safety injection actuation signal. Therefore, we will condition the operating license to require procedures to preclude the automatic reapplication of pressurizer heaters to Class 1E buses upon SIAS reset. The procedures shall be available prior to exceeding 5 percent power. Plant operation prior to that time is acceptable based on the reduced risk of plant operation at low power.

We conclude, subject to implementation of the above-described procedure prior to operation above 5% power, that the design of the San Onofre 2 and 3 pressurizer heaters is consistent with the positions of NUREG-0737 and is, therefore, acceptable.

II.K.2.17 Potential for Voiding in the Reactor Coolant System During Transients

In Supplement No. 1 to the SER we stated that the applicants had committed to provide the results of an analysis of the generic applicability of these requirements by January 1, 1982, in conformance with the requirements of NUREG-0737. However, by letter dated February 9, 1982, the applicants requested relief on submittal of this analysis until May 1, 1982. The applicants state that the requested relief is justified and will not compromise plant safety because the results of these analyses are available and show that if voiding occurs during the anticipated transients, the NRC acceptance criteria for these transients are still met. On the basis of this result, and the reduced risk of operation at low power, we find the submittal of the analyses by May 1, 1982 to be acceptable. We will condition the San Onofre 2 license to require that this date be met.

II.K.3.30 Revised Small-Break LOCA Methods to Show Compliance with 10 CFR 50, Appendix K

In Supplement No. 4 to the SER we stated that the applicants had committed to submit additional information on model justification and/or a revised analytical model for staff review by March 31, 1982. By letter dated February 9, 1982, the applicants indicated that the CE owners group was presently reviewing and modifying the generic analytical model and has requested relief until May 1, 1982. As justification, the applicants stated that this was an engineering evaluation only, and consequently, no plant modifications were anticipated to result from the study. As a result, operation prior to May 1, 1982 poses no hazard to public health and safety. We have reviewed the applicants' justification for the request for relief and concur with the basis given. Consequently, the applicants' submittal will be required by May 1, 1982.

III.A.2 Improving Licensee Emergency Preparedness - Long Term

In Supplement No. 1 to the SER we stated that the applicants had committed to meet the implementation schedule of NUREG-0737 for construction of the improved emergency support facilities. By letter dated February 11, 1982, the applicants requested relief from October 1, 1982 until January 1, 1983. The basis for the request is the likelihood of delay due to unforeseen difficulties such as adverse weather, material delays, and labor relations problems. Since interim facilities will be available to fulfill the functions of the improved facilities, we find the request acceptable, and will grant the requested relief.

APPENDIX A

CONTINUATION OF CHRONOLOGY OF RADIOLOGICAL REVIEW

January 13, 1982	Letter from applicants providing information on instrumentation for inadequate core cooling
January 14, 1982	Letter from applicants concerning design verification program by General Atomics.
January 15, 1982	Letter from applicants transmitting several Potential Finding Reports
January 18, 1982	Letter from applicants regarding instrumentation for detection of inadequate core cooling.
January 18, 1982	Letter from applicants transmitting two Potential Finding Reports
January 18, 1982	Letter from applicants concerning effects of input voltage faults on plant protection system matrix relay circuit.
January 19, 1982	Letter from applicants forwarding additional Potential Finding Reports.
January 20, 1982	Letter from applicants transmitting additional Potential Finding Reports.
January 21, 1982	Letter from applicants transmitting additional Potential Finding Reports.
January 22, 1982	Letter from applicants forwarding General Atomics letter regarding its fiscal independence.
January 22, 1982	Issuance of Supplement No. 4 to Safety Evaluation Report.
January 22, 1982	Letter from applicants transmitting a Potential Finding Report.
January 22, 1982	Letter from applicants transmitting the following (proprietary and nonproprietary) reports: (1) "CETOP-D Code Structure and Modeling Methods for San Onofre Nuclear Generating Station Units 2 and 3, "CEN-160(S), Rev. 1 (2) "Response to Questions on Documents Supporting SONGS 2 License Submittal," CEN-184(S), Rev. 2

	(3) "CPC/CEAC System Phase I Software Verification Test Report," 176(S), Rev. 01
	(4) "CPC/CEAC System Phase II Software Verification Test Report," CEN-173(S), Rev. 02.
January 25, 1982	Letter from applicants transmitting Revision 4 to Security Plan.
January 25, 1982	Letter from applicants forwarding "Interim Report -- Independent Verification of San Onofre Nuclear Generating Station Units 2 & 3 Seismic Design and Quality Assurance Program Effectiveness".
January 25, 1982	Letter from applicants transmitting additional Potential Finding Reports.
January 26, 1982	Letter from applicants transmitting a Potential Finding Report.
January 26, 1982	Letter from applicants transmitting additional Potential Finding Reports.
January 27, 1982	Letter from applicants concerning Items I.C.1 and II.K.2.17 of NUREG-0737.
January 27, 1982	Letter from applicants advising of intent to install fixed emergency lighting in certain areas prior to exceeding 5% power.
January 28, 1982	Meeting with applicants to discuss radiological technical specifications.
January 28, 1982	Meeting with applicants to discuss interim report on design verification program.
January 28, 1982	Letter from applicants forwarding recent meeting handouts and associated changes in control room design.
January 29, 1982	Letter from applicants transmitting revised responses to staff Question 222.44 concerning effects of control system failures and revised FSAR information concerning the shutdown cooling system and related operating procedures.
January 29, 1982	Letter from applicants forwarding several Potential Finding Reports.
January 29, 1982	Letter from applicants transmitting "CNSI Cement Solidification System" Document No. 4313-01354-01-NP.
January 29, 1982	Letter from applicants providing supplemental information to January 18, 1982 letter on matrix relay circuit.

February 1, 1982	Letter from applicants transmitting request for extension of construction completion date for Unit 2 to April 2, 1982.
February 1, 1982	Letter from applicants advising that future Preliminary Finding Reports on seismic design will be transmitted to NRC after they are fully processed by General Atomics.
February 3, 1982	Letter from applicants forwarding documents related to implementation program for radiation monitors.
February 3, 1982	Letter from appplicants advising of compliance with potential license conditions in Safety Evaluation Report and revised Appendix E to 10 CFR Part 50.
February 4, 1982	Letter from applicants forwarding several additional Potential Finding Reports.
February 5, 1982	Letter from applicants forwarding several additional Potential Finding Reports.
February 8, 1982	Board Notification - NRR Draft SER on ACRS concerns Regarding System 80 Feed and Bleed Capability.
February 9, 1982	Meeting with applicants to discuss disposition of potential findings on GA design verification program.
February 11, 1982	Letter from applicants forwarding letter dated February 10, 1982 from General Atomic summarizing current status of design verification program.
February 14, 1982	Letter from applicants forwarding letter dated February 14, 1982 from General Atomic documenting statements made in telephone discussions and additional review work.

APPENDIX B

ERRATA TO SER AND SER SUPPLEMENTS

I. SER

A. Page 1-4, paragraph 1, line 3: change "50-percent step" to "55-percent step."

B. Page 3-3, paragraph 2, line 2: change "Revision 3" to "Revision 2."

C. Page 6-1, paragraph 2, line 9: add "except as noted in FSAR Appendix 3A" after "Sensitized Stainless Steel."

D. Page 6-6, category "Reactor Cavity" in Table 6.1: change node "5" to node "7."

E. Page 6-17, paragraph 8, line 3: change "245,000 ft^3" to "245,000 gallons."

F. Page 9-17, paragraph 3, lines 4 and 5: change "includes four 25 percent capacity supply fans and one 100 percent capacity exhaust fan," to "includes two 50 percent capacity supply fans. No exhaust fan is used."

G. Page 9-17, paragraph 5, line 4: change "There is one exhaust fan" to "There are two exhaust fans."

H. Page 9-19, paragraph 2, line 7: change "incapacitate more than one pump." to "prevent delivery of required system capacity."

I. Page 9-20, 4th and 5th items in list of areas: change "Room 308" to "FHB Room 309" and "Room 301" to "FHB Room 302."

J. Page 9-22, paragraph 1, lines 9, 10, and 11: delete last sentence in pararaph.

K. Page 9-33, paragraph 6, line 4: change "combustion air turbocharger" to "turbocharger combustion air aftercooler."

L. Page 9-33, paragraph 7, line 4: insert "combustion air" between "turbocharger" and "aftercooler."

II. SER Supplement No. 1

A. Page 22-89, paragraph 3, line 6: add "and (5) the turbine driven auxiliary feedwater pump exhaust." after "for the two units."

B. Page 22-89, paragraph 3: add the following to the end of this paragraph. "Either the monitors for the steam dump/safety valves or the monitor for the steam jet air ejector exhaust will be used

for determining releases from the exhaust from the turbine driven auxiliary feedwater pump.

III. SER Supplement No. 2

A. Page 2-1, paragraph 3, line 5: delete "gasoline."

IV SER Supplement No. 4

A. Page 1-2, Section 1.7, Item (3) in list: delete item (3) in its entirety, and renumber all subsequent items in the list.

B. Page 1-2, Section 1.8, item (2) in list: delete item (2) in its entirety.

APPENDIX C

PRINCIPAL NRC STAFF REVIEWERS

H. Rood	Project Manager
T. Bishop	Design Verification Program
J. Knight	Design Verification Program
W. Haass	Design Verification Program
R. Lipinski	Structural Engineering
H. Krug	Control Room Habitability
R. Stevens	Instrumentation and Control Systems
G. Harrison	Fire Protection
R. Anand	Fire Protection
T. Chandrasekaran	Radwaste System
J. Clifford	Procedures and Test Review
J. Lazevnick	Power Systems
C. Liang	Reactor Systems

NRC FORM 335 (7-77)

U.S. NUCLEAR REGULATORY COMMISSION

BIBLIOGRAPHIC DATA SHEET

1. REPORT NUMBER (Assigned by DDC)
NUREG-0712
Supplement No. 5

4. TITLE AND SUBTITLE (Add Volume No., if appropriate)

Safety Evaluation Report Related to the Operation of San Onofre Nuclear Generating Station, Units 2 and 3

2. (Leave blank)

3. RECIPIENT'S ACCESSION NO.

7. AUTHOR(S)

5. DATE REPORT COMPLETED

MONTH	YEAR
February	1982

9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

DATE REPORT ISSUED

MONTH	YEAR
February	1982

6. (Leave blank)

8. (Leave blank)

12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code)

Same as 9. above

10. PROJECT/TASK/WORK UNIT NO.

11. CONTRACT NO.

13. TYPE OF REPORT

PERIOD COVERED (Inclusive dates)

15. SUPPLEMENTARY NOTES

Docket Nos. 50-361 and 50-362

14. (Leave blank)

16. ABSTRACT (200 words or less)

Supplement No. 5 to the Safety Evaluation Report for the application filed by Southern California Edison Company, et al for licenses to operate the San Onofre Nuclear Generating Station, Units 2 and 3 (Docket Nos. 50-361 and 50-362) located in San Diego County, California has been prepared by the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission. This supplement addresses several items that have come to light since issuance of Supplement No. 4, including an additional applicant request for relief from certain dated requirements of NUREG-0737.

17. KEY WORDS AND DOCUMENT ANALYSIS

17a. DESCRIPTORS

17b. IDENTIFIERS/OPEN-ENDED TERMS

18. AVAILABILITY STATEMENT

Unlimited

19. SECURITY CLASS (This report)
Unclassified

20. SECURITY CLASS (This page)
Unclassified

21. NO. OF PAGES

22. PRICE
$

NRC FORM 335 (7-77)

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

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
U.S. NUCLEAR REGULATORY
COMMISSION

U.S. MAIL

12C55507 8877 2 AN
US NRC
ADM DIV OF TIDC
POLICY & PUBLICATIONS MGT BR
PDR NUREG COPY
LA 212
WASHINGTON DC 20555

NUREG-0712, Suppl. No. 5

SAN ONOFRE NUCLEAR GENERATING STATION, UNITS 2 AND 3