

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-206/88-27, 50-361/88-28, 50-362/88-30

Docket No. 50-206, 50-361, 50-362

License No. DPR-13, NPF-10, NPF-15

Licensee: Southern California Edison Company  
P. O. Box 800, 2244 Walnut Grove Avenue  
Rosemead, California 92770

Facility Name: San Onofre Units 1, 2, and 3

Inspection at: San Onofre, San Clemente, California

Inspection conducted: October 31 through November 4, 1988

Inspector: C. W. Caldwell 12/1/88  
C. W. Caldwell, Project Inspector Date Signed

Approved By: C. W. Caldwell FOR 12/1/88  
P. H. Johnson, Chief, Date Signed  
Reactor Projects Section 3

Inspection Summary:

Inspection on October 31 - November 4, 1988 (Report Nos. 50-206/88-27,  
50-361/88-28, and 50-362/88-30)

Areas Inspected: Routine unannounced regional inspection of Multiplant Action Item A-15, "Inspection For Verification Of Quality Assurance Request Regarding Diesel Generator Fuel Oil;" evaluation of plant trips and events; review of QA audits and surveillances; and Part 21 reports. Inspection procedures 25593, 93702, 35701, 36100, 92701, and 30703 were covered.

Safety Issues Management System (SIMS) Items:

(Closed) Multiplant Action (MPA) Item A-15, "Inspection For Verification Of Quality Assurance Request Regarding Diesel Generator Fuel Oil" (Paragraph 2).

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Results:

General Conclusions and Specific Findings:

The inspector noted a concern with the licensee's reportability evaluation of a plant problem involving the inverters for the shutdown cooling system isolation valves. In particular, the licensee took over two months to determine that this problem was reportable. As discussed in the November 2, 1988 management meeting, the licensee's reportability evaluations have given previous cause for NRC concern. The perception, as expressed at the November 2 meeting, was that the licensee tends to spend a large amount of time trying to justify why a problem is not reportable, rather than taking the conservative approach of reporting the issue if its reportability is questionable (Paragraph 3).

The inspector also expressed concern regarding the ability of the QA audit and surveillance program to identify precursors to plant problems. A number of audits and surveillances were reviewed. There appeared to be relatively few substantive findings, considering the numerous problems which were identified by organizations other than QA during the past year. Thus, there was a perception that audits and surveillances were excessively programmatic and compliance oriented (Paragraph 4).

Summary of Violations and Deviations: No violations or deviations were identified.

Open Items Summary:

One inspector followup item (Paragraph 5.f) concerning the adequacy of a safety evaluation for a Part 21 report was identified.

Seven Part 21 items were closed during this inspection (Paragraph 5).

## DETAILS

### 1. Persons Contacted

#### Licensee Personnel

- H. E. Morgan, Station Manager
- \*R. W. Krieger, Operations Manager
- \*K. E. O'Connor, Construction Manager
- D. E. Shull, Jr., Maintenance Manager
- \*D. A. Herbst, Quality Assurance (QA) Manager
- \*M. A. Wharton, Assistant Technical Manager
- \*W. M. Lazear, QA Supervisor
- \*R. D. Plappert, Compliance Supervisor
- \*G. T. Gibson, Compliance Engineer
- \*M. S. Zenker, Compliance Engineer
- \*W. W. Strom, Independent Safety Engineering Group (ISEG) Engineer

\*Denotes those attending the final exit meeting on November 4, 1988.

The inspector also contacted licensee operators, engineers, technicians, and other personnel during the course of the inspection.

### 2. (Closed) Multiplant Action Item A-15, "Inspection For Verification Of Quality Assurance Request Regarding Diesel Generator Fuel Oil" (25593)

This Multiplant Action was established to verify that plants utilizing diesel generators as backup power sources have complied with 10 CFR 50, Appendix B requirements regarding diesel generator (D/G) fuel oil. As a result of this request, the inspector reviewed the licensee's program for purchase and sampling of D/G fuel oil.

The inspector found that fuel oil was controlled by the licensee as a Quality Class II item, and that purchasing and testing were performed under a controlled program. Technical Specification (TS) 4.8.1.1.2 established the frequency and requirements for testing of D/G fuel oil, and the acceptance criteria were established in procedure SO-123-III-6.6, "Diesel Fuel Oil Specifications and Testing Requirements." The Testing and acceptance criteria were obtained from ASTM-D975-81, "Standard Specification for Diesel Fuel Oils;" ASTM-D2276-83, "Standard Test Methods for Particulate Contamination in Aviation Turbine Fuels;" and Regulatory Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators."

In accordance with this program, the licensee had a third party test the fuel oil prior to purchase, at the manufacturer's facility, in order to verify oil quality prior to delivery. The fuel oil was then delivered to the licensee's storage facility at which time it was tested in accordance with procedure SO123-III-6.6. The fuel oil was sampled again for water and specific gravity when it was received on-site and then periodically (quarterly) in accordance with the specifications of procedure SO123-III-6.6. The inspector concluded that the controls provided by the

licensee's program satisfied the requirements for the establishment of quality controls for D/G fuel oil. Therefore, this item is closed.

No violations or deviations were identified.

3. Evaluation Of Plant Trips And Events (93702)

On October 28, 1988, the licensee notified the NRC in accordance with 10 CFR 50.72(b)(2)(iii) that, during special testing of a Unit 3 shutdown cooling (SDC) system isolation valve emergency power supply, the associated inverter automatically shut off due to a low-voltage protective circuit at a battery input voltage of 115 volts (DC). However, the inverter design specified a low voltage shutoff setpoint of 105 VDC.

The inspector reviewed this item with SCE personnel and noted that on July 1, 1988, the licensee had issued nonconformance report (NCR) GR-0043 to determine a root cause for fuse failures on the inverters that supply power to the shutdown cooling (SDC) suction valves. During this evaluation, the licensee found that the valves would not operate at a battery test voltage (using a special test arrangement and procedure) of 115 VDC. As a result of the followup testing that was performed, the licensee realized that there was a deficient condition at low voltage conditions and initiated NCR G-892, Revision 0, on August 6, 1988 to evaluate this condition.

The investigation resulted in the licensee determining that the inverters would trip at 115 VDC (instead of 105 VDC) due to an inductor in series with the trip unit. The inductor added a brief 10 VDC voltage drop when the load (SDC valve Limitorque operator) was actuated. This, in turn, resulted in a voltage drop to 105 VDC across the trip unit while the battery supply voltage was 115 VDC. For corrective action, the licensee reduced the inverter low voltage trip setting to 95 VDC. This would correspond to a supply voltage of 105 VDC from the battery, with a 10 VDC drop across the inductor. The inspector reviewed the technical manual supplied by the vendor and noted that the effect of the inductor on the low-voltage trip was not identified. The inspector considered that the vendor could have made this design feature known to the licensee.

The inspector questioned why this condition was not found during performance of the licensee's original testing program for the SDC valves and reviewed preoperational test procedure 3PE-451-01, Revision 0, "Vital Bus System Operational Load Test." The inspector found that the procedure did not provide for an integrated test of the system from source to load at varying voltage conditions. In this case, the battery, inverter, and SDC valve motor were tested together at nominal system voltage and individually at the low-voltage limit. The inspector was concerned that this problem could be generic to other components in the plant that were powered by the vital batteries.

This concern was discussed with licensee personnel who indicated that they had performed an evaluation of the potential for other equipment to have the same problem. Their evaluation determined that the inverters for the SDC valves are the only inverters that have an inductor in series with the trip unit. In addition, the licensee checked the records for all other

inverters in all three units and found that all were tested at low-voltage conditions.

The inspector discussed the possibility of any other equipment having the potential for similar conditions to exist. However, after a review of the drawings for the DC buses and associated loads, none were found. As a result, the inspector concluded that this was an isolated case, due to the unique system design which uses a static inverter in series with an AC motor operated valve.

The inspector questioned the licensee as to why this problem had not been reported to the NRC when it was first identified. The licensee responded by stating that the problem was originally determined to be not reportable, since it was believed that operators and technicians could have easily detected the source of the problem and taken effective actions to correct the deficiency in a short period of time (approximately four hours). This was based upon NUREG 1022, Supplement 1, question and answer 7.6. The licensee used this question and answer as guidance for reportability when reasonable operator actions to correct minor problems can be assumed. However, after a number of discussions, the licensee determined on October 28, 1988 that operators and technicians could need as much as eight hours to diagnose and correct the problem, and reported the condition promptly to the NRC.

The inspector considered that the length of time to make this decision (almost three months) was excessive, and questioned the use of NUREG 1022, question and answer 7.6. In addition, the inspector discussed this item with personnel in the NRC's Office for Analysis and Evaluation of Operational Data (AEOD). A preliminary judgement by AEOD personnel was that the licensee was incorrect in applying NUREG 1022, answer 7.6 in this case. Specifically, this question and answer would apply to a case wherein a component failed during operation, and in which reasonable and timely actions were taken to restore the component to operable status. In this case, it was believed that the licensee was making assumptions for actions that were beyond the intent of 7.6. The inspector noted that, although an excessive amount of time elapsed before this issue was reported, the failure to initially make the report was identified and reported by the licensee. Accordingly, consistent with the NRC's enforcement policy, enforcement was not deemed appropriate.

The inspector noted that this and other of the licensee's reportability evaluations have given cause for NRC concern. During a management meeting on November 2, 1988, the NRC discussed a perception that SCE tends to spend a large amount of time trying to justify why a problem is not reportable, rather than taking the conservative approach of reporting an item if its reportability is questionable. As a result, additional inspections in this area will be conducted in the future.

As followup to this event, the licensee was continuing an investigation to determine if this problem was reportable under the provisions of 10 CFR Part 21.

No violations or deviations were identified.

4. Review Of QA Audits And Surveillances (35701)

The inspector reviewed a number of QA audits and surveillances in order to determine whether they were being performed in a manner that could assess the effectiveness of the licensee's programs. The inspector reviewed the following QA audit reports:

- SCES 001-88 - Topical Quality Assurance Manual (TQAM) compliance
- SCES 002-88 - Technical Specification (TS) audit on control room air treatment system snubbers
- SCES 003-88 - TS audit - TQAM compliance for "Responsibility" and "Organization"
- SCES 004-88 - TS compliance surveillance of pressurizer relief valves, pressurizer, auxiliary feedwater (AFW) instrumentation, AFW monitoring, AFW surge tanks, radiation monitoring, and reactor coolant system (Note: this audit had some significant findings with regard to the engineering and construction, operations, and licensing organizations)
- SCES 005-88 - TQAM programmatic licensing and procurement document development
- SCES 006-88 - TS compliance of chemistry and health physics (HP) organizations
- SCES 007-88 - TS compliance for nuclear safety group (NSG) and on-site review committee (OSRC) activities
- SCES 008-88 - Actions to assure deficiencies are corrected
- SCES 009-88 - Special test exceptions
- SCES 010-88 - Corporate document management
- SCES 012-88 - Compliance with TQAM - organization, quality planning, document management, training, and personnel certification and electronic data processing system controls
- SCES 016-88 - Radiation protection
- SCES 017-88 - TS 3.0 compliance
- SCES 018-88 - Nonconformances

The inspector reviewed a number of QA surveillance reports including the following:

- SOS-10-88 - Receiving material
- SOS-11-88 - Inventory control for incore and excore detectors
- SOS-12-88 - Gantry crane modifications
- SOS-13-88 - QA walkthrough of Units 2 and 3
- SOS-14-88 - Post-accident sampling system testing
- SOS-15-88 - Review of completed maintenance orders
- SOS-16-88 - Verify storage location
- SOS-17-88 - Control room toxic gas isolation system
- SOS-18-88 - QA walkthrough of Unit 1
- SOS-19-88 - Field observation of preventive maintenance activities
- SOS-20-88 - Conduct of station maintenance
- SOS-21-88 - Reactor trip breaker maintenance testing for Units 2 and 3
- SOS-23-88 - Valve lineup verification for auxiliary feedwater and D/G air start systems

- SOS-24-88 - Fire protection equipment and unauthorized combustibles
- SOS-25-88 - Charging pump accumulator bladder failures
- SOS-45-88 - Verification of fire barriers and Notice of Violation response

The overall assessment was that these audits were generally traditional in nature. They appeared to lack focus and strength in areas which have not been previously assessed or in areas where problems had not been previously identified at San Onofre. For example, one audit was conducted to review conditions at San Onofre in response to NRC violations at other facilities. Although, the licensee's efforts were recognized, in some cases, audit documents noted that there were no similar requirements in effect at San Onofre and as a result, the item was not considered a problem. The inspector noted that the auditor did not probe into the problem and ask questions as to why there was no requirement at San Onofre or whether one should be considered. Another example was an audit which was conducted to review root cause assessments. An audit finding was that, in some of the root cause assessments, an incorrect cause code was identified. However, the auditor did not probe into the reason as to why incorrect cause codes were used.

There appeared to be relatively few substantive findings, considering the numerous problems, particularly in the engineering area, which had been identified by organizations other than QA during the past year. Thus, there was a perception by the NRC that audits and surveillances were excessively programmatic and compliance oriented. These perceptions were presented to the licensee during a management meeting on November 2, 1988. During that meeting, the Regional Administrator pointed out that the NRC would be conducting additional inspections of the licensee's audit and surveillance program, and the functions of other quality oversight groups.

5. Licensee's Program For Handling 10 CFR Part 21 Reports (36100) (92701)

The inspector reviewed the licensee's actions on several industry 10 CFR Part 21 reports to determine if an adequate evaluation and resolution was made by SCE for the items identified. In this manner, the licensee's program for evaluating and resolving items applicable to 10 CFR Part 21 could also be evaluated.

The inspector reviewed the licensee's actions on the following Part 21 items:

a. (Closed) Part 21 (50-206/87-15-P), "Failures In Vitro Corporation Load Sequencers"

This 10 CFR Part 21 Report identified that a utility experienced a failure of a Vitro Corporation load sequencer during scheduled testing. The failure was due to an open electrical connection on one crimp lug.

The licensee reviewed this item and determined that no Vitro Corporation load sequencers were used at San Onofre. Therefore, this item is closed.

- b. (Closed) Part 21 (50-206/88-04-P), "Manufacturing Defects On General Electric Undervoltage Devices"

This Part 21 report identified potential problems resulting from the failure of the undervoltage (UV) trip attachments of General Electric (GE) reactor trip breakers. In particular, a manufacturing defect was identified with the armature button which was improperly mounted on the UV trip device armature of the AK-2-15 and AK-2-25 reactor trip breakers. This concern was also the subject of NRC Information Notice 88-38, "Failures Of Undervoltage Trip Attachments On General Electric Circuit Breakers," and various other operating experience review (OER) correspondence.

The licensee evaluated this Part 21 report for all three units and found that the UV trip devices for the reactor trip breakers used at San Onofre were different than those used at the facilities where problems were found. The most notable differences were that San Onofre uses DC-powered instead of AC-powered UV trip devices, and that San Onofre had adjustable UV trips. The utilities which had experienced the failures had non-adjustable trips. The licensee reviewed the material history and noted that there had been no failures of the UV trip attachments used at San Onofre. Thus it was concluded that the UV trip devices used in the plant were acceptable for use-as-is. However, for additional assurance, the licensee prepared a change to Procedure S023-I-9.27, "Reactor Trip Breaker (RTB) Inspection, Adjustment, and Test," to verify that the UV trip device components are properly aligned. The inspector considered that the licensee's evaluation was adequate. Therefore, this item is closed.

- c. (Closed) Part 21 (50-206/88-05-P), "Defects In Calcon Pressure Sensors Used In IMO Delaval Diesel Generators"

This item concerned a potential problem with Calcon P/N B4400 Pressure Sensor/Lubricating Oil Trips used in IMO Delaval Inc. diesel generators. In particular, the sensor would fail due to tolerance problems, which resulted in a much higher pressure needed to activate the sensor than was originally required. If this problem should occur, it would happen within a few hours of operation. IMO Delaval recommended that all devices not installed be returned for remachining, inspection, and testing.

The licensee evaluated this Part 21 report and found that a number of these sensors were used in Unit 1. The licensee found that the subject parts were installed and in stores. The stores items were returned to the vendor for inspection. The licensee reviewed the maintenance history for the parts which had been installed, and found that they had been in service for an extended period of time. All parts had operated for more than five hours and no failures had occurred. As a result, the licensee concluded that these parts were acceptable for use-as-is. The inspector considered that the licensee's action on this item was appropriate. Therefore, this item is closed.



d. (Closed) Part 21 (50-361/88-06-P), "Defective Replated Clevite Bearings Used In General Motors Diesel Generators"

This Part 21 report identified a defect in Clevite upper connecting rod bearings used in the emergency diesel generators manufactured by General Motors Electro Motive Division. The bearings in question were manufactured in January and February 1988.

The licensee reviewed the maintenance history and checked the supply stores and found that none of these bearings were installed in the emergency diesel generators nor were any in stock. In addition, the subject bearings were added to the Control Of Problem Equipment (COPE) list to prevent procurement of the questionable bearings in the future. This item is closed.

e. (Closed) Part 21 (50-361/88-07-P), "Defective Camshaft Brackets On General Motors Diesel Generators"

This issue concerned a condition observed at San Onofre in which a camshaft support bracket for the 20-cylinder emergency diesel generator (D/G) engines failed. The cause of the failures was determined to be the result of the combined stresses exceeding the allowable design stresses on the bracket. The principal stress component was a high alternating stress imposed on the bracket through the cam drive gear train from the crankshaft.

For corrective action on this Part 21 item, the licensee issued maintenance orders (MOs) to replace the camshaft bearing support brackets in the D/Gs with acceptable vendor replacements in Units 2 and 3. The inspector noted that the licensee replaced the camshaft support brackets for the Unit 2 D/Gs with an interim design improvement during the last refueling outage (completed December 1987). This interim design was supplied by the vendor until a final design could be completed. The final design was sturdier than the interim design and was installed in the Unit 3 D/Gs during the last refueling outage (completed August 1988). Discussions with the licensee indicated that the interim replacement brackets were of an improved design and material, and that the licensee and vendor expected them to perform satisfactorily until the final design could be installed in Unit 2. This item is closed.

f. (Closed) Part 21 (50-361/88-09-P), "Potentially Bad Solder Connections Of Gamma Metrics Flux Monitors"

This item identified the potential for solder connection leaks which could allow moisture intrusion into Gamma Metrics neutron flux monitors, resulting in an impaired or degraded signal.

For corrective action, SCE returned all spare connectors to Gamma Metrics (as requested) for testing. As of this inspection, the licensee was waiting for the vendor's test results and for receipt of new connectors to be supplied. However, as an interim measure, the licensee issued NCR G-0865 in order to initiate an equipment qualification (EQ) review for acceptability of the installed

components. A safety evaluation resulted in a decision to accept as-is, based on the fact that no problems have been experienced with the components installed and because the vendor had identified that there was only a possibility that the connectors could leak. The inspector questioned the acceptability of the licensee's safety evaluation based on the information provided. The evaluation will be reviewed further as inspector followup item (50/361-88-28-01).

g. (Closed) Part 21 (50-361/88-11-P), "Malfunctions Of Potter And Brumfield Relays"

This Part 21 report noted potential problems with contaminant plate-out and/or corrosion on the internal surfaces of Potter and Brumfield relay motor chambers.

The inspector discussed the status of this Part 21 report and found that the licensee was aware of the problems identified and had been working with the vendor to implement corrective actions. In particular, a design change prototype was in the process of being tested; however, the results were pending. The inspector considered that the licensee's actions were adequate and this item is closed.

As a result of the action on these items, the inspector concluded that the licensee's program for evaluating and resolving 10 CFR Part 21 issues was adequate.

No violations or deviations were identified.

6. Exit Meeting (30703)

On November 4, 1988, an exit meeting was held with the licensee representatives identified in paragraph 1. The inspector summarized the inspection scope and findings as described in this report. Concerns were identified to licensee management regarding reportability of a problem experienced with the SDC valves (Paragraph 3) and the effectiveness of the QA audit and surveillance program (Paragraph 4). Licensee representatives acknowledged the inspector's concerns and stated that additional attention would be given to these areas. The reportability concern was also discussed during a management meeting held at the San Onofre Site on November 2.

The licensee did not identify as proprietary any of the materials reviewed or discussed during this inspection.