

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Report No.: 50-312/85-14
Docket No.: 50-312
License No.: DPR-54
Licensee: Sacramento Municipal Utility District
6201 S Street
Post Office Box 15830
Sacramento, California 95813
Facility Name: Rancho Seco Nuclear Generating Station
Inspection At: Herald, California
Inspection Conducted: May 20-24, 1985

Inspector: *R.C. Wilson* 8/7/85
R. C. Wilson, Equipment Qualification & Test Engineer Date

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INSPECTION SUMMARY

Inspection on May 20-24, 1985 (Inspection Report No. 50-312/85-14)

Areas Inspected: Special, announced inspection to review the licensee's implementation of a program per the requirements of 10 CFR 50.49 for establishing and maintaining the qualification of electric equipment within the scope of 10 CFR 50.49. The inspection also included evaluations of the implementation of equipment qualification (EQ) corrective action commitments made as a result of deficiencies identified in the January 17, 1983 Safety Evaluation Report (SER) and the December 10, 1982 Franklin Research Center (FRC) Technical Evaluation Report (TER). The inspection involved 213 inspector hours onsite.

Results: The inspection determined that the licensee has implemented a program to meet the requirements of 10 CFR 50.49 except for three open items listed below. No deficiencies were found in the licensee's implementation of corrective action commitments made as a result of SER/TER identified deficiencies.

<u>Item</u>	<u>Report Paragraph</u>	<u>Item Number</u>
1. Rockbestos Firewall SR and Firewall III Cable	4.D.	50-312/85-14-01
2. Implementation of EQ Procedures	4.A.(4)	50-312/85-14-02
3. Limitorque Operator T-drains	4.C.	50-312/85-14-03

DETAILS

1. PERSONS CONTACTED:

1.1 Sacramento Municipal Utility District (SMUD):

- *R. J. Rodriguez, Assistant General Manager, Nuclear
- *R. E. Daniels, Supervisor, Electrical Engineering
- *J. Delezenski, Senior Licensing Engineer
- *R. L. Keilman, Manager, Nuclear Engineering
- *P. Kelso, Electrical Engineer/EQ Coordinator
- *R. Roehler, Licensing Engineer
- *D. Abbott, Supervisor, Mechanical Engineering
- *N. Brock, Electrical/I&C Supervisor
- *C. Linkhart, Electrical Engineer, Nuclear Operations
- *J. Williams, Supervisor, I&C Engineering, N.E.
- *R. P. Oubre', Manager, Nuclear Operations Department
- *R. A. Dieterich, Supervisor, Licensing
- *L. G. Schwieger, Manager, QA
- *R. McQuade, QA Engineer
- *W. Speight, Reg. Compliance Engineer
- *J. Jewett, Site QA Supervisor
- *J. V. McColligan, Principal Project Engineer
- J. Field, Engineering and QC Superintendent
- R. W. Colombo, Regulatory Compliance Supervisor
- R. White, Electrical Engineer
- G. Coward, Plant Superintendent
- R. Lawrence, Mechanical Maintenance Superintendent
- S. Crunk, Regulatory Compliance

1.2 SMUD Contractors/Consultants:

- *A. Naderi, Supervising Engineer, Impell
- *L. Walter, Engineer, Impell
- *W. D. Fargo, EQ Engineer, Impell
- *P. Curtis, EQ Engineer, Impell
- *W. T. Best, Senior Nuclear Engineer, Impell
- *G. A. Weber, Project Manager, Impell
- *J. Haar, Manager, EQ Section, Impell
- *V. Franceschi, Engineer, Impell
- *B. D. Maytum, Engineer, Impell
- A. V. Rubin, Senior Engineer, Impell
- *M. Nakao, Licensing, Bechtel
- *P. Johnson, I&C Supervisor, Bechtel
- *K. K. Chan, Electrical Engineer, Bechtel
- *C. M. Hazari, Electrical Engineer, Bechtel
- *D. B. Wood, Project Manager, Bechtel
- *J. R. Shelter, Outage Manager, Babcock & Wilcox
- N. Goulding, Design Engineer, Babcock & Wilcox
- *R. K. Ho, EPM, Consultant to Nuclear Utility Group on Equipment Qualification

1.3 Nuclear Regulatory Commission:

*G. G. Zech, Chief, Vendor Program Branch, IE

*T. Young, Jr., Section Chief, Region V

*S. Miner, Project Manager, ORB#4, NRR

J. H. Eckhardt, Senior Resident Inspector

*Denotes those present at exit interview at Rancho Seco on May 24, 1985.

2. PURPOSE:

The purpose of this inspection was to review the licensee's implementation of the requirements of 10 CFR 50.49 and the implementation of committed corrective actions for SER/TER identified deficiencies.

3. BACKGROUND:

On May 16, 1984, the NRC held a meeting with SMUD officials to discuss SMUD's proposed methods to resolve the EQ deficiencies identified in the January 17, 1983 SER and December 10, 1982 FRC TER. Discussions also included SMUD's general methodology for compliance with 10 CFR 50.49 and justification for continued operation for those equipment items for which environmental qualification was not completed. The minutes of the meeting and proposed method of resolution for each of the EQ deficiencies were documented in a July 2, 1984 submittal from the licensee. A January 31, 1985 SMUD letter stated that a contractor had been hired for independent review of the EQ program, resulting in January 31, 1985 and February 20, 1985 submittals identifying additional deficiencies, identifying corrective measures, and providing Justifications for Continued Operation. The TER and the July 2, January 31, and February 20 submittals were reviewed by the inspection team members and were used to establish a status baseline for the inspection.

4. FINDINGS:

A. EQ Program Compliance with 10 CFR 50.49

The NRC inspectors examined the licensee's program for establishing the qualification of electric equipment within the scope of 10 CFR 50.49. The program was evaluated by examination of the licensee's qualification documentation files, review of procedures for controlling the licensee's EQ efforts, verification of the adequacy and accuracy of the licensee's 10 CFR 50.49 equipment list, and examination of the licensee's program for maintaining the qualified status of the covered electrical equipment.

Based on the inspection findings, which are discussed in more detail below, the inspection team determined that the licensee has implemented a program to meet the requirements of 10 CFR 50.49, although three Open Items were identified. Two of the Open Items involve qualification of specific equipment types, and the third relates to verification of the implementation of newly developed procedures for controlling EQ activities.

Rancho Seco's second refueling outage after March 31, 1982, commenced before March 31, 1985, and the plant was still shut down at the time of the inspection. Full compliance with the requirements of 10 CFR 50.49 is required by restart.

(1) Qualification Files, General

The NRC inspectors determined that Rancho Seco has completed preparation of qualification documentation files for equipment that must be qualified to 10 CFR 50.49. The documentation is assembled primarily in a series of Calculation Files, each addressing a type of equipment from a distinct vendor and typically consisting of two or more binders. Supplementary generic information such as details of environmental zone descriptions is arranged in several Design Input binders.

Each EQ Calculation File includes the following:

- o Equipment description
- o Ancillary component description (interface equipment such as cable entrance seal)
- o Identification of qualification requirements
- o Environmental and functional parameters (normal and accident for each)
- o Equipment evaluation (test specimen and sequence, service conditions, and functional testing)
- o Evaluation results (including TER-specific notes and deficiencies, System Component Evaluation Worksheets (SCEW sheets), and Qualification maintenance requirements)
- o Conclusion
- o Response to applicable IE Information Notices (IN)
- o References (test reports, correspondence, etc.)

The calculation files contain plant walkdown sheets verifying the identity and the installation details of all master list equipment. Also included is a completed Maintenance and Replacement Schedule Summary (MARSS) for each component. The MARSS shows all EQ-required maintenance and surveillance information including intervals. The MARSS sheets (typically five pages per component) are transmitted to Operations under the procedures described in paragraph 4.A.(2) below for their use.

The NRC inspectors reviewed the EQ calculation files for 13 equipment types, some of which included various sizes, models, etc. Each equipment type corresponded to one or more of the "Items" in the FRC TER. The types were selected in advance by the inspection team and identified to the licensee during the entrance meeting. All files were found to be well arranged and accurate. Although voluminous (e.g., the Westinghouse motor

file included copies of the plant's Construction Permit and Operating License as references for the 40-year service life, and the Limitorque file filled eight three-inch binders), the files were not difficult to audit because of their effective organization. No deficiencies were found relative to general aspects of the EQ files.

(2) EQ Program Procedures

The NRC inspectors reviewed the licensee's EQ program as described in the Quality Control Instruction, "Environmental Equipment Qualification Program," QCI 14 Rev. 0, dated May 17, 1985. Additional program procedures reviewed for evaluating the licensee's 10 CFR 50.49 program implementation included:

Engineering Configuration Program, ECP-1, Rev. 7 dated May 17, 1985, "Rancho Seco Configuration Control Procedure"

Quality Assurance Program, QAP-3, Rev. 1 dated May 17, 1985, "Quality Assurance Classification"

Quality Assurance Implementing Procedure, QAIP-7, Rev. 0 dated May 10, 1985, "Tracking and Surveillance of Equipment Qualification (EQ) Program"

Quality Control Instruction, QCI-4, Rev. 1 dated May 13, 1985, "Review and Control of Material Requisitions"

Administrative Procedure AP-3, Rev. 30 dated May 20, 1985, "Work Request"

AP-42, Rev. 5, dated May 18, 1985, "Maintenance Information Management System (MIMS) Procedure"

AP-46, Rev. 2, dated May 20, 1985, "Nuclear Operations Technical Manual Control Procedure"

AP-605, Rev. 10 dated March 27, 1985 "General Warehousing"

AP-650, Rev. 4 dated May 20, 1985 "Preventive Maintenance Program"

The licensee's program was reviewed to verify that adequate procedures and controls had been established by the licensee to implement requirements of 10 CFR 50.49. Areas of the program reviewed included methods and their effectiveness for:

- (a) Requiring all equipment that is located in harsh environments and is within the scope of 10 CFR 50.49 to be included on the list of equipment requiring qualification (EQ Master List).

- (b) Controlling the generation, maintenance, and distribution of the EQ Master List.
- (c) Defining and differentiating between mild and harsh environments.
- (d) Establishing harsh environmental conditions at the location of equipment through engineering analysis and evaluation.
- (e) Establishing and maintaining a file of plant conditions.
- (f) Establishing, evaluating, and maintaining EQ documentation.
- (g) Training personnel in the environmental qualification of equipment.
- (h) Controlling plant modifications such as installation of new and replacement equipment, and providing for updating replacement equipment to 10 CFR 50.49 criteria.

As a part of the program review, the licensee's Quality Assurance (QA) program was reviewed as it pertains to equipment qualification. Interviews were conducted with members of the QA staff including the QA site supervisor. These interviews revealed that in-place procedures are providing direction for the processing of Work Requests and Nonconformances involving equipment with environmental qualification. The designation of EQ equipment on these documents is provided, if applicable, from the Master Equipment List. Quality Assurance has implemented a program to perform surveillances on all EQ related documents for verification of completion of any commitments or requirements. These EQ documents include: Modification, Engineering Change Notice (ECN), Drawing Change Notice (DCN), Corrective Maintenance and Preventative Maintenance Work Request, Purchase Order, Master Equipment List (MEL), Receiving Inspection Data Report, and Maintenance and Replacement Schedule Summary Sheet (MARSS).

The inspectors reviewed a sample of Work Requests, MEL entries, and ECNs and observed them to be appropriately identified with EQ requirements.

The inspectors also reviewed training records and training lesson plans for members of the licensee staff. It was noted that lesson plans were developed for all disciplines dealing with EQ. The attendance lists included key personnel responsible for the implementation of the EQ program.

Procedure QCI-14 is the umbrella procedure which provides an overview of the licensee's environmental qualification program for electrical equipment. This procedure identifies, among other things, the EQ Program responsibilities of various plant managers, supervisors, and coordinators; and identifies the Nuclear Engineering EQ Coordinator as the principal person responsible for coordinating the Rancho Seco EQ Program. As such, control for assuring that the objectives of the EQ program are accomplished rests with one person.

QCI-14 in conjunction with procedures ECP-1 and AP-46 provides the controls/procedures for assuring that the Nuclear Engineering EQ coordinator is involved in any changes to the requirements of the EQ equipment resulting from plant configuration changes, NCR dispositions, EQ related vendors manuals, licensing correspondence, purchase requests and specifications, and inspection matters.

QCI-14 in conjunction with procedures NEP-4106, AP-3, AP-42, AP-650 and AP-605 provides the procedures for the nuclear engineering EQ Coordinator to control EQ calculations (qualification files), MARSS, inspection masters (plans) for new parts/equipment, warehouse services, MEL sheets, and maintenance trending evaluation results and recommendations.

The inspectors examined the procedures identified above in detail to determine if they provided sufficient controls to assure that the licensee's EQ program as established would function to maintain an accurate, complete, and up-to-date master list, to preserve the qualified status of existing equipment and guarantee the correct qualification of replacement equipment.

The inspectors concluded that the licensee's procedures comprise an adequate EQ program. No programmatic or implementation deficiencies were identified. However, it was noted that most of the procedures are quite new (1985), and they were prepared for the licensee by a contractor. These observations, combined with others noted in paragraph 4.A.(4) below concerning the EQ maintenance program, suggested that the licensee's EQ program implementation should be monitored in a future inspection. This concern is addressed as an Open Item in paragraph 4.A.(4).

(3) 10 CFR 50.49 List (EQ Master List)

The licensee is required to maintain a list of the equipment that must be qualified under 10 CFR 50.49. The licensee's first EQ Master List is dated October 31, 1980 and supplemented/revised January 13, 1981; it was developed for the licensee's response to IE Bulletin 79-01B. The basis for generating the Master List is described in a letter from SMUD to NRC dated October 8, 1984. Procedure QCI 14, "Environmental Equipment Qualification Program," provides an overview of the licensee's program for maintaining

the qualified status of the equipment. Procedures NEP 4106, "Design Calculations" and AP 42, "Maintenance Information Management Systems (MIMS) Procedure" along with QCI 14 assures the maintenance, accuracy, and completeness of the EQ Master List.

These procedures were examined in detail to determine if the program for maintaining the EQ Master List is adequate.

The following audit sample items were selected after a comprehensive examination of the operating/system procedures, emergency operating/casualty procedures, and piping and instrumentation drawings listed below. The sample was used to verify the completeness of the EQ Master List.

20 Transmitters	6 Excore Thermocouples
15 Limitorque Valve Operator/Motors	4 Thermal Elements
11 Asco Solenoid Valves	2 Radiation Detector Elements
5 Pump Motors	

Operating/System Procedures

Operating Procedure B.2, Rev. 30, April 1, 1985, "Plant Heatup and Startup"

Operating Procedure B.4, Rev. 31, April 17, 1985, "Plant Shutdown/Cooldown"

Operating Procedure B.9, Rev. 7, January 25, 1985, "Soluble Boron Concentration Control"

System Procedure A.8, Rev. 19, April 15, 1985, "Decay Heat System"

System Procedure A.15, Rev. 22, January 22, 1985, "Makeup Purification and Letdown System"

System Procedure A.51, Rev. 20, January 9, 1985, "Auxiliary Feedwater System"

Emergency Operating/Casualty Procedures

Emergency Procedure E.05, Rev. 19, April 24, 1985, Excessive Heat Transfer

Emergency Procedure E.07, Rev. 19, April 24, 1985, Inadequate Core Cooling

Emergency Procedure E.02, Rev. 19, April 20, 1985, Vital Systems Status Verification

Casualty Procedure 101, Rev. 19, April 20, 1985, A Large Local Core Flood Tank Is Emptying

Casualty Procedure 103, Rev. 19, April 20, 1985, Transient Termination Following An Occurrence That Leaves RCS Saturated With OTSGs Removing Heat

P&IDs

M-512, Radiation Detection Monitoring System
M-520, Reactor Coolant System
M-521, Seal Injection and Makeup System
M-522, Decay Heat System
M-524, Containment Building Spray System
M-532, Feedwater System
M-551, Heating, Ventilation & Air Conditioning System

The audit sample items including TMI modification items were all identified on the master list. No deficiencies were identified.

(4) EQ Maintenance Program

The inspectors reviewed the licensee's program for preserving the qualified status of equipment through maintenance and surveillance activities. The Nuclear Engineering EQ Coordinator is responsible for ensuring that all required replacement and maintenance activities are documented in the equipment's EQ calculation package. This is accomplished by detailing all recommendations developed from the environmental evaluation results (Qualification Maintenance Requirements), which are compiled in the MARSS calculation file. The MARSS files provide input to the Maintenance Information Management System (MIMS), a computer data base which provides timely notification of maintenance requirements in the form of Preventative Maintenance Work Requests.

Calibration, surveillance and maintenance procedures that were written were reviewed for the inclusion of EQ related requirements as defined in the MARSS sheets. The inspectors found no discrepancies or deficiencies. The inspectors did note that many of the EQ procedures required for future maintenance activities were not yet in effect, and in certain cases were not written or approved. Procedures were in place wherever needed.

The licensee has committed to have approved procedures thirty days prior to any required EQ maintenance activity. The licensee has prepared a schedule for all EQ equipment, which outlines the frequency and the projected due date of the maintenance activity. This will act as a guide for the writing and approval of the maintenance procedures.

A concern relative to the effectiveness of equipment installation/maintenance procedures was identified during NRC inspection of the installed equipment. This inspection revealed that several actuator housing and motor housing drain plugs which were supposed to have been removed upon installation

of Limitorque operators were still in place. Procedure review indicated that drain plug removal was not required to be verified during the post-installation walk-down. An additional walkdown was performed and work instructions were issued during the inspection and all drain plugs which were required to be removed were removed. This discrepancy, together with the need to prepare and issue additional maintenance procedures and the recent transition to licensee responsibility for the contractor-prepared EQ program procedures and qualification files, was the basis for concluding that SMUD's implementation of their EQ program should be monitored in a future inspection. Implementation of EQ Procedures is an Open Item, 50-312/85-14-02.

B. SER/TER Commitments

The NRC inspectors evaluated the implementation of EQ corrective action commitments made as a result of SER/TER-identified deficiencies as stated in a licensee letter dated July 2, 1984. Also evaluated were the additional commitments identified in licensee letters of January 31 and February 20, 1985. In addition the licensee stated in the July 2 letter that his schedule to achieve compliance with R.G. 1.97 is identified in a separate program. This may result in additional equipment being added to the Master List.

Based on review of the files and the 10 CFR 50.49 Master List, and on the plant walkdown inspection, the NRC inspectors identified no deficiencies in the implementation of SER/TER commitments.

C. Plant Physical Inspection

The inspection was performed near the end of a refueling outage; thus, in-containment equipment was accessible for inspection. Twelve equipment types were inspected, usually with more than one specimen involved, mostly inside containment. The inspectors examined characteristics such as mounting configuration, orientation, interfaces, model number, environment, and physical condition.

One concern was identified during the physical inspection. The T-drain for the motor of Limitorque operator FSV 46203 was discovered to be installed on top of the motor, whereas qualification is based on the absence of drains in the top of the motor housing. The licensee stated that he would remove all T-drains from the tops of Limitorque motor housings prior to startup. Limitorque Operator T-drains is an Open Item, 50-312/85-14-02.

D. Detailed Review of Qualification Files

The NRC inspectors examined files for 13 selected equipment types to verify the qualified status of equipment within the scope of 10 CFR 50.49. In addition to comparing plant service conditions with qualification test conditions and verifying the bases for these conditions, the inspectors reviewed areas such as required post-accident operating time compared to the duration of time the equip-

has been demonstrated to be qualified, similarity of tested equipment to that installed in the plant (e.g., insulation class, materials of components of the equipment, test configuration compared to installed configuration, and documentation of both), evaluation of adequacy of test conditions, aging calculations for qualified life and replacement interval determination, effects of decreases in insulation resistance on equipment performance, adequacy of demonstrated accuracy, evaluation of test anomalies, and applicability of EQ problems reported in IE INs/Bulletins and their resolution.

During its review of the component files the inspection team identified one concern, described below. Otherwise, the files were found to be readily auditable and complete.

The inspectors were unable to conclude that the files adequately documented qualification of two types of Rockbestos (Cerro) cable, Firewall SR and Firewall III, although there is no reason to believe that either would fail during a LOCA. In each case the concern centers on establishing similarity between plant cable and test specimens.

The qualification of Firewall SR was based on a Rockbestos test report, "Qualification of Firewall SR Class 1E Electrical Cables," dated March 2, 1978. This report is subject to IN 84-44, which reported quality assurance deficiencies in the Rockbestos equipment qualification test programs. The SMUD qualification file identified this problem with the Rockbestos test report and stated that the Firewall SR qualification is based on the Rockbestos test report... "with the understanding that the results are subject to verification by the Rockbestos Supplemental Test Program." The Supplemental Test Program is scheduled to be completed in July 1986. On May 24, 1985, SMUD presented additional data to support qualification of Firewall SR using the Franklin report F-C2857, dated September 1970 but similarity between the plant cable and test specimens was not adequately established.

For Firewall III cable, the file deficiency involves similarity between the Rancho Seco cable and specimens tested by Sandia Laboratory. Rancho Seco's cable is insulated with chemically cross-linked polyolefin formulation 760-5, obtained by Rockbestos from a different supplier than the formulation 760-D that was tested. The licensee argued that all cross-linked polyolefins meeting IPCEA standards would be satisfactory, as evidenced by successful Sandia test results for cables from three different vendors. The licensee obtained thermal aging and dry electrical data for the plant cable, but did not have corresponding data for the tested specimens. Other information such as radiation and wet electrical characteristics was not provided for either type of cable. The inspectors concluded that similarity between the plant cable and test specimens was not adequately demonstrated.

Rockbestos Firewall SR and Firewall III Cable is an Open Item, 50-312/85-14-01.

E. IE Information Notices and Bulletins

The NRC inspectors reviewed and evaluated SMUD's activities related to the review of EQ-related IE INs/Bulletins. The inspectors review included examination of SMUD's procedures and EQ documentation packages relative to 12 INs and one Bulletin. The procedure review determined that SMUD does have a system for distributing, reviewing, and evaluating INs/Bulletins relative to equipment within the scope of 10 CFR 50.49. During the review of individual component qualification files the NRC inspectors evaluated SMUD's actions with respect to INs/Bulletins. No concerns were identified during this review except relative to Rockbestos cable as described in paragraph 4.D of this report.