



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
151 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-348/85-23 and 364/89-23

Licensee: Alabama Power Company
600 North 18th Street
Birmingham, AL 35291-0400

Docket Nos.: 50-348 and 50-364

License Nos.: NPF-2 and
NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: September 25-29, 1989

Inspector: Paul J. Hillion for
N. Merriweather

10/27/89
Date Signed

Approved by: Paul J. Hillion for
T. E. Conlon, Chief
Plant Systems Section
Engineering Branch
Division of Reactor Safety

10/27/89
Date Signed

SUMMARY

Scope:

This routine, announced inspection was conducted to review the licensee's corrective actions in response to previous inspection findings involving environmental qualification (EQ) of electrical equipment.

Results:

The inspection concentrated on the corrective actions taken by the licensee to resolve those EQ violations and Unresolved Items identified in NRC Inspection Reports 50-348, 364/87-25 and 87-30. Although Alabama Power Company (APCO) does not agree with the findings, the licensee took the necessary corrective actions to resolve all NRC concerns.

Based on the results of this inspection the licensee is now considered to be in full compliance on previous NRC EQ concerns. One exception, is the failure by the licensee to replace the Raychem/Chico A cable entrance seal on the Victoreen High Range Radiation Monitor which is a Regulatory Guide 1.97 item. The inspector noted that substantial improvements have been made in Farley's EQ Program (e.g., training, procedures, documentation and hardware). The level of knowledge regarding EQ at the site has greatly improved. One new unresolved item was identified involving the qualification of the Victoreen High Range Radiation Monitor. This problem may be generic to the nuclear industry. The

qualified configuration of the detector consisted of the power and signal cables installed in a sealed conduit arrangement. The detector at Farley uses a "NAMCO/Chico A" Seal at the detector junction box. The problem with this configuration is that APCO has not adequately demonstrated to NRC satisfaction that the "NAMCO/Chico A" Seal design is qualified. Additionally Victoreen tried testing similar type seal designs with numerous failures because moisture passed thru the seal via the cable jacket. It appears that this seal design is also subject to the same failure mode of loss of cable jacket integrity. The licensee understands the concern and indicated that it is on their schedule to be reworked. However, there is not an acceptable fix available, other than to seal the cable back to the penetration. The longest run of cable from the penetration is approximately 240 feet. The licensee indicated that they intend to replace the seal with a qualified seal design. This issue remains open and is discussed in Paragraph 2.1.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *R. Berryhill, Systems Performance and Planning Manager
- *S. Fullmer, Supervisor, Safety Audit and Engineering Review
- *R. Hill, Assistant General Manager -Operations
- *D. Morey, General Manager-Nuclear Plant
- *C. Nesbitt, Technical Manager
- *J. Richardson, QC Engineer
- *R. Stewart, Nuclear Engineering Licensing Representative
- *W. Ware, QC Engineer

Other licensee employees contacted during this inspection included craftsmen, engineers, security force members, technicians, and administrative personnel.

Other Organizations

- *E. Reeves, Senior Project Manager, NRR

NRC Resident Inspectors

- G. Maxwell, Senior Resident Inspector
- *W. H. Miller, Resident Inspector

- *Attended exit interview

2. Action on Previous Inspection Findings (92701) (92702)

- a. (Closed) Unresolved Item 50-348, 364/87-25-03, Inadequate Peer Inspection Program

During the subject inspection it was identified that Peer inspections of electrical splice configurations in general had been ineffective allowing unqualified "V" type tape splices to be installed and accepted in EQ applications. The unqualified tape splices have been replaced with Raychem heat shrink splices. To prevent recurrence the licensee has developed detailed installation and inspection procedures for Raychem kits and in line splice materials. To verify the adequacy and effectiveness of QC inspections Farley's Administrative Procedure FNP-0-AP-31 requires that the QC Engineer observe selected independent inspections. When inspections are performed, evaluated and documented in accordance with procedures. In 1988, at least four observations were performed to witness independent

inspections of Raychem splices. On a sampling basis these observations confirmed that activities were being performed in accordance with procedures.

- b. (Closed) Violations 50-348, 364/87-30-01, Use of Unqualified Commercially Procured Equipment in EQ Applications

The NRC identified a violation for failure to establish measures to assure that applicable regulatory requirements and design bases were preserved during the procurement and use of QA review Code "C" and Code "D" non-safety related items in EQ applications. The licensee responded to the violation in a letter to the NRC dated May 5, 1988. In this letter APCO describes the corrective action taken to resolve the concerns. The licensee revised Administrative Procedure FNP-O-AP-21 to require an engineering review of QA Review Code "C" or "D" non-safety related items prior to installation in safety-related applications. The licensee revised procedure FNP-O-AP-9 to incorporate a parts dedication program for procurement and dedication of commercial grade items for use in safety-related applications. EQ Program procedure FNP-O-ETP-4108 requires that Commercial grade parts and materials serving a safety-related function in EQ components be purchased and dedicated for safety-related use per procedure FNP-O-AP-9. Based on the above actions taken by the licensee this item is considered closed.

- c. (Closed) Violation 50-348, 364/87-30-02, Failure to Procure Replacement Equipment in Conformance with 10 CFR 50.49 (L).

The violation occurred because APCO did not include the upgrading requirements of 10 CFR 50.49 (L) for replacement equipment into their EQ program. This was identified as another example of a previous violation cited in inspection reports 50-348, 364/87-11 and 87-14. The licensee responded to the violation in a letter dated May 5, 1988. The action taken by the licensee was to review all EQ components replaced since February 1983. All items were determined to be either qualified to 10 CFR 50.49 or "sound reasons to the contrary" were documented as recommended by Regulatory Guide 1.89. The licensee performed a review of store-room inventories and removed from the EQ inventory those components that were not qualified to 10 CFR 50.49. The licensee has also revised EQ program implementation procedures to require replacement equipment to be upgraded to 10 CFR 50.49 or "Sound reasons to the contrary" must be documented on a component by component basis to justify not replacing the component with a component qualified in accordance with 10 CFR 50.49. The licensee is now considered to be in full compliance. This item is considered closed.

- d. (Closed) Violation 50-348, 364/87-30-03, Failure to Take Prompt and Timely Corrective Action For EQ Programmatic Deficiency Identified By SAER In 1983.

During the subject inspection the inspector examined two Corrective Action Reports (CARs) identified as 830 and 1251 that described significant conditions adverse to quality. Corrective Action Report (CAR) 830 identified a deficiency involving failure of the design change program to identify vendor technical manuals and vendor drawings as requiring update prior to implementation of a plant modification. The second CAR 1251 describes a deficiency found in November 1986, where the preventive maintenance of EQ motor operated valves was found to be inadequate due to a lack of detail in procedure FNP-O-MP-28.137 and personnel error. A violation was cited because the licensee failed to correct these CARs in a reasonable time period. The licensee denied the alleged violation in a response dated November 14, 1988. The evaluation of this response will be addressed by NRC later. The inspector verified that corrective action for both CARs have been completed. The licensee has updated vendor drawings and vendor technical manuals for EQ equipment. The design organizations responsible for design control drawings have revised their procedures to provide for updating of vendor documents and vendor manuals. The preventive maintenance procedure for motor operated valves FNP-O-MP-28.137 has been revised. The licensee was in full compliance on the above items on March 31, 1988. Based on the above this item is considered closed.

- e. (Closed) Unresolved Item 50-348, 364/87-30-05, Thermal and Radiation Effects Not Evaluated for Lead Wire Insulation, Terminal Blocks and Resistors for the Gems Level Transmitter

During the review of the GEMs level transmitter qualification file, Model XM-36495, it was noted that thermal and radiation aging effects were not evaluated for all susceptible materials. Specifically, the lead wires, terminal block and resistors were not evaluated. The file stated that it was not necessary to evaluate the effects for these materials since the materials were immersed in silicone oil which would protect them from age related affects. The walkdown of the wide range sump level transmitters in Unit 2 revealed that there was no silicone oil in the junction box as required. The assumption that the materials won't experience these affects was considered invalid based on the walkdown inspection. This item is essentially part of the violation discussed in paragraph 2.f. below and the licensee has replaced the wide range Unit 2 transmitters. This item is now considered closed.

- f. (Closed) Violation 50-348,364/87-30-06, The Licensee Found Wide Range and Narrow Range Containment Sump Level Transmitters on Both Units in a Configuration That Was Not Considered Qualified By Existing Test Data.

This item is also discussed in the paragraph above. A violation was cited because the GEMs level transmitters were not found in the tested configuration with the instrument junction boxes filled with silicone fluid and the Unit 1 narrow range transmitter had unqualified V-type tape splices. The licensee's response to the violation is still being evaluated by NRC. As stated earlier, the Unit 2 wide range transmitters were replaced and the Unit 1 narrow range transmitter splices were removed and replaced with Raychem. All transmitters were refilled with silicone oil. The inspector examined the approved work requests that replaced the splices on the Unit 1 narrow range transmitters, replaced the Unit 2 wide range transmitters and refilled all junction boxes with silicone fluid. This item is now considered closed.

- g. Limitorque Motor Operator Violations:

(Closed) 50-348, 364/87-30-07, Limitorque Motor Operated Valves (MOVs) Inside Containment Without Functional T-drains Installed.

(Closed) 50-348, 364/87-30-08, Unqualified Limit Switch Installed In A Limitorque Valve Inside Unit 1 Containment

(Closed) 50-348, 364/87-30-09, EQ File Did Not Include Qualification For Terminal Blocks Used In Motor Operated Valves In That Various Terminal Blocks Were Identified During Walkdowns.

All of the above violations relate to deficiencies identified between the tested and the installed configuration of limitorque motor operated valves. The corrective action taken by the licensee on each concern was reviewed and found acceptable. The licensee installed T-drains on EQ Limitorque MOVs having provision for such drains inside containment. Five operators in Unit 1 and three operators in Unit 2 did not have T-drains installed. For those operators without T-drains installed an acceptable analysis exists to justify the deviations from the tested configuration. The Unqualified limit switch on valve MOV 3441D was replaced with a qualified limit switch on November 24, 1987. The licensee discovered nine MOVs with unqualified terminal blocks. The terminal blocks have since been replaced with qualified splices. The licensee has inspected all the EQ limitorque motor operated valves and documented the as-built configurations on Drawings (DWG) D-204900 and D-181900 "Installation Details for Environmentally Qualified Limitorque MOVs". Considering the above, the violations are now considered closed.

- h. (Closed) Violation 50-342, 364/87-30-11, Licensee EQ Files Did Not Support Qualification For Use Of States And General Electric Terminal Blocks In Instrumentation Circuits.

During the subject inspection the licensee took the position that States terminal blocks were qualified for use inside containment at Farley based on similarity to Connectron N553 terminal blocks. The NRC inspectors did not agree that the similarity analysis was sufficient in that the quoted IRs were totally unrealistic. In addition, APCO provided the inspection team a copy of a GE test report dated November 27, 1983 which further indicated that the insulation resistance (IR) values demonstrated by States and GE terminal blocks during design basis testing were not acceptable for use in instrumentation circuits. However, to resolve this issue, the licensee replaced the terminal blocks with qualified Raychem splices. The licensee stated in their response to the violation dated November 14, 1988 that the terminal blocks were replaced on both units by December 17, 1987. The inspector toured Unit 1 containment and selectively examined splices in 3 containment penetrations. The cable numbers were recorded and later verified by review of EQ drawings to be EQ circuits. This item is now considered closed.

- i. (Closed) Unresolved Item 50-348, 364/87-30-12, Certain Solenoid Valves (SOVs) May Not Be Qualified Due To A Lack Of Cable Entrance Seals.

In a letter to the NRC dated October 17, 1988, APCO committed to install Conax ECSA cable entrance seals, qualified to 10 CFR 50.49, on certain Automatic Switch Company (ASCO) valves located both inside containment and the main steam valve room in each unit. This work is being accomplished to resolve an EQ concern regarding moisture intrusion on long term ASCO SOVs. The work on Unit 1 is now in progress and should be completed during the current Unit 1 refueling outage. The work on Unit 2 was completed during the last refueling outage. This item is now considered closed.

- j. (Closed) Unresolved Item 50-348, 364/87-30-13, Automatic Switch Company Solenoid Valves Installed In Unit 1 Containment Exceeded Their Qualified Life

The licensee reanalyzed the aging calculations using Arrhenius methodology and taking credit for additional aging effects resulting from self heating and aging during the LCCA test and assuming an average containment temperature of 97.90°F. The calculations used what is considered to be a conservative 104°F. The method of using the average temperature is not considered acceptable. However, this point is moot because the valves are beginning refurbished based on the design qualified life temperature of 120°F or on actual temperature measurements. The licensee is currently monitoring

temperatures inside containment to substantiate the assumptions made in the design. Data shows that some areas of the containment may exceed 130°F. This item will be pursued by the licensee as part of their ongoing EQ program. This item is closed.

- k. (Closed) Violation 50-348,364/87-30-14, Qualification Not Demonstrated for Raychem Seal Installed on Target Rock Solenoid Valve Cable Entrance

The corrective action taken by the licensee was to issue and implement Production Change Requests (i.e., PCRs 86-1-3873 and 87-2-4108) that replaced the cable entrance seals on the Target Rock SOVs with qualified Conax Seal assemblies. The work was performed and documented by approved maintenance work requests. This item is now considered closed.

- l. (Closed) Violation 50-348, 364/87-30-15, Raychem/Chico A Seal Qualification Not Demonstrated Because Bonding of Raychem Material Has Not Been Addressed.

The licensee has taken corrective action to replace all Raychem/Chico A Seals on NAMCO CA-180 limit switches inside Units 1 and 2 containment and the Main Steam Valve Room (MSR) on Units 1 and 2. The licensee has also committed to have NAMCO EC-210 Connectors installed on certain Unit 1 MSR NAMCO limit switches identified in their October 17, 1988 letter to the NRC. As stated earlier the licensee still maintains that the Raychem/Chico A seal is qualified. Thus, the licensee had these seals installed on the Victoreen High Range Radiation Monitors. These seals have not been replaced and are not considered qualified since moisture could possibly enter the detector via the cable jacket if loss of cable jacket integrity occurs. This was experienced during qualification testing of the Victoreen detector. This lead to the cable being installed in a sealed conduit arrangement. The licensee acknowledged the concern and agreed that the seal would be replaced when an acceptable design change is available and will be implemented during a future refueling outage on each unit. The previous open item will be closed and this item will be tracked and identified as Unresolved Item 50-348, 364/89-23-01, Unqualified Raychem/Chico A Seal On Victoreen High Range Radiation Monitor.

- m. (Closed) Violation 50-348, 364/87-30-16, Unqualified Splice on Hydrogen Recombiners

The licensee replaced the questionable 5-to-1 tape splices on all four hydrogen recombiners with Raychem Splice Kits. The design change was approved by PCRs 87-1-4553 and 87-2-4554 and implemented via approved maintenance work requests. This item is now considered closed.

- n. (Closed) violation 50-348, 364/87-30-17, Use of Unqualified Grease on Motor Operated Valves

The licensee has undertaken a program to replace the grease in all EO Limitorque MOVs with Exxon nebula EPO grease. The valves on Unit 1 should be completed prior to startup from the current refueling outage. The remaining valve operators on Unit 2 should be completed by the end of the next refueling outage. Based on the above, this item is considered closed.

- o. (Closed) Violation 50-348, 364/87-30-18, Unqualified Lubricants

Since the initial finding the licensee has put together a qualification file for lubricants used on EQ motors. The greases have been subsequently tested by the licensee to establish qualification to 10 CFR 50.49. This item is now considered closed.

- p. (Closed) Violation 50-348, 364/87-30-19, Use of Unqualified V-Type Electrical Tape Splices on SOVs, MOVs and Inside Containment Fans

The corrective actions taken by the licensee were replace the questionable "V-type" electrical tape splices with Raychem heat shrink and revise the EQ Master List to include general notes regarding cable splices. A check of all completed maintenance work requests compared to the latest EQ Master List confirmed that all "V-type" electrical splices have been replaced. To prevent recurrence the licensee has developed detailed installation and inspection procedures for use of Raychem heat shrink kits and in-line splice materials. This item is now considered closed.

3. Exit interview

The inspection scope and results were summarized on September 29, 1989, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee. One new Unresolved Item was identified as follows.

Unresolved Item 50-348, 364/89-23-01, Unqualified Raychem/Chico A Seal on Victoreen High Range Radiation Monitor, Paragraph 2.e.