



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

Report Nos.: 50-348/90-15 and 50-364/90-15

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: August 6-15, 1990

Inspection at Farley site near Dothan, Alabama

Inspector: M. N. Miller 10-2-90
 M. N. Miller, Reactor Inspector Date Signed

Approved by: T. E. Conlon 10-2-90
 T. E. Conlon, Chief Date Signed
 Plant Systems Section
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was conducted in the areas of the licensee's conformance to Regulatory Guide 1.97, Instrumentation For Light-Water Cooled Nuclear Power Plants To Assess Plant And Environs Conditions During And Following An Accident.

Results:

In the areas inspected, violations or deviations were not identified.

The licensee has implemented a program of plant instrumentation to meet the intent of Regulatory Guide (RG) 1.97, Revision 2, the NRC Safety Evaluation Reports, and their submittals. Several minor weaknesses were identified in the areas of quality assurance documentation and the calibration program. Spare leads in electrical control cabinets were not properly capped (taped) and labeled as "spares". The licensee acknowledged these concerns and proposed to take certain corrective actions. The inspector considered the proposed actions to be appropriate and reasonable.

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Strengths

The licensee uses the loop method in the calibration program which simultaneously verifies calibration of all instruments in the string (loop).

The site has formed a maintenance engineering group and increased their engineering staff.

Maintenance work performed on the instruments was clearly and concisely described in the "work orders" and calibration data sheets.

Weaknesses

The Quality Assurance program does not acknowledge that RG 1.97 instrumentation has special requirements and needs to be identified as RG 1.97 items in the equipment documentation lists.

The calibration program does not include loop verification for signals transmitted to the inadequate core cooling monitor (ICCM) system.

Spare leads in electrical cabinets are not always labeled as "spares" and the ends are not properly capped (taped).

The strengths and weaknesses are discussed in paragraph 2.b.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *T. W. Cherry, I&C Superintendent
- *S. Fulmer, Supervisor, Safety Audit and Engineering Reviews
- *J. T. Harrison, I&C Engineer
- *R. D. Hill, Assistant General Manager, Operations
- *J. K. Osterholtz, Manager, Operations
- *J. A. Ripple, Project Engineer
- *L. M. Stenson, Assistant General Manager, Support
- *J. J. Thomas, Manager, Maintenance

Other licensee employees contacted during this inspection included engineers, operators, technicians, and administrative personnel.

Other Organizations

Bethel Power Corporation

A. Diperna
R. Watson

NRC Resident Inspector

*G. F. Maxwell, SRI

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Inspection of Licensee's Implementation of Multiplant Action Item A-17: Instrumentation for Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (25587)

Criterion 13, "Instrumentation and Control," of Appendix A to 10 CFR Part 50 includes a requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions as appropriate to ensure adequate safety. Regulatory Guide 1.97 describes a method acceptable to the NRC staff for complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following an accident.

The licensee responded to RG 1.97 (NUREG 0737, Supplement 1) in letters dated March 30, 1984; June 29, 1984; August 17, 1984; April 10, 1985; and August 8, 1986. The NRC Safety Evaluation Reports (SER) for RG 1.97 were issued in January and February 1987. The SERs concluded that the licensee's instrumentation for RG 1.97 either conforms to or is justified in deviating from RG 1.97, Revision 2.

This inspection assessed the licensee's RG 1.97 instrumentation program using (1) the design and qualification criteria described in RG 1.97, Revision 2; (2) the EG&G Technical Evaluation Report No. EGG-EA-6794 dated November 1986, Conformance to Regulatory Guide 1.97, Joseph N. Farley Nuclear Plant Units 1 and 2; (3) the licensee's submittals as discussed previously; and (4) 10 CFR Part 50.

A random sample of 22 variables from the licensee's submittal was selected to evaluate the licensee's program. The variables selected were classified as Category 1 and 2 which have the most stringent design requirements of all RG 1.97 instruments. The instruments examined and the results achieved are discussed in the paragraphs and tables below.

a. Category 1 and 2 Instruments

The instrumentation listed in the following Tables was examined to verify that the design and qualification criteria for RG 1.97, the SERs and licensee commitments had been satisfied. The instrumentation was inspected by reviewing drawings; procedures, data sheets and other documentation; and performing walkdowns for visual observation of selected installed equipment including control room indicators and recorders. The following areas were inspected:

- (1) Equipment Qualification - The EQ Master Equipment List, Q-list, I&C List, and instrument drawings were reviewed for confirmation that the licensee had addressed environmental qualification requirements and seismic qualification.
- (2) Redundancy - Walkdowns were performed to verify by visual observation that selected instruments were installed as specified and that separation requirements were met. In addition, wiring drawings for all listed Category 1 instrumentation were reviewed to verify redundancy and channel separation.
- (3) Power Sources - Wiring drawings were reviewed to verify the instrumentation is energized from a safety-related power source if applicable.
- (4) Display and Recording - Walkdowns were performed to verify by visual observation that the specified display and recording instruments were installed. Wiring drawings were reviewed to verify there was at least one recorder in a redundant channel and two indicators, one per division (channel) for each measured variable. Recorders are further discussed in Paragraph 2.b.

- (5) Range - Walkdowns were performed to verify the actual range of the indicator/recorders was as specified in RG 1.97 or as stated in the licensee's submittal. Review of calibration procedures verified sensitivity and overlapping requirements of RG 1.97 for instruments measuring the same variable.
- (6) Interfaces - The wiring drawings, I&C List, and Q-list were reviewed to verify that safety-related isolation devices were used when required to isolate the circuits from nonsafety systems.
- (7) Direct Measurement - Wiring drawings were reviewed to verify that the parameters are directly measured by the sensors.
- (8) Service, Testing, and Calibration - The maintenance program for performing calibrations and surveillances was reviewed and discussed with the licensee. Calibration and surveillance procedures and the latest data sheets for each instrument were reviewed to verify the instruments have a valid calibration. A weakness identified in this area is discussed in paragraph 2.b.
- (9) Equipment Identification - Walkdowns were performed to verify that Types A, B and C instruments designated as Categories 1 and 2 were specifically identified with a common designation on the control panels.

NOTE: Instruments in this report are applicable to both units that have a X in their instrument number.

TABLE 1
CATEGORY 1 INSTRUMENTS

<u>Variable</u>	<u>Instrument Number</u>
RCS Pressure (Wide Range)	X-B21-PT-402
	X-B21-PI-402A
	X-B21-PT-403
	X-B21-PI-403A
	ICCM Train A
	ICCM Train B
	SPDS Computer
RCS Hot Leg Temperature	X-B21-TE-413
	X-B21-TE-423
	X-B21-TE-433
	X-B21-TR-413
	ICCM Train A
	ICCM Train B
	SPDS Computer
RCS Cold Leg Temperature	X-B21-TE-410
	X-B21-TE-420
	X-B21-TE-430
	X-B21-TR-410
	ICCM Train A
	ICCM Train B
	SPDS Computer
Steam Generator Level (Narrow Range)	X-C22-LT-474
	X-C22-LI-474
	X-C22-LT-475
	X-C22-LI-475
	X-C22-LT-476
	X-C22-LI-476
	X-C22-LT-484
	X-C22-LI-484
	X-C22-LT-485
	X-C22-LI-485
	X-C22-LT-486
X-C22-LI-486	
X-C22-LT-494	
X-C22-LI-494	

TABLE 1
CATEGORY 1 INSTRUMENTS

<u>Variable</u> (cont'd)	<u>Instrument Number</u>
Steam Generator Level (Narrow Range)	X-C22-LT-495
	X-C22-LI-495
	X-C22-LT-496
	X-C22-LI-496
	X-C22-LR-476
	SPDS Computer
Steam Generator Level (Wide Range)	X-N11-LT-477
	X-N11-LT-487
	X-N11-LT-497
	X-N11-LR-477
	SPDS Computer
Refueling Water Storage Tank Level	X-F16-LT-501
	X-F16-LI-4075A
	X-F16-LT-502
	X-F16-LI-4075B
	SPDS Computer
Condensate Storage Tank Level	X-P11-LT-515
	X-P11-LI-4132A
	X-P11-LT-516
	X-P11-LI-4132B
	X-N23-PT-3211A
	X-N23-PI-3211A
	SPDS Computer
Containment Pressure (Extended Range)	X-T14-PT-950Y
	X-T14-PI-950Y
	X-T14-PT-950Z
	X-T14-PR-950
	SPDS Computer
Containment Pressure (Normal Range)	X-E13-PT-950
	X-E13-PI-950
	X-E13-PR-950
	X-E13-PT-951
	X-E13-PI-951
	X-E13-PT-953
	X-E13-PI-953
	SPDS Computer
Containment Water Level	X-E11-LT-3594A
	X-E11-LI-3594A
	X-E11-LT-3594B
	X-E11-LI-3594B
	SPDS Comp:

TABLE 1CATEGORY 1 INSTRUMENTS

Auxiliary Feedwater Flow	X-N23-FT-3229A X-N23-FI-3229A X-N23-FT-3229B X-N23-FI-3229B X-N23-FT-3229C X-N23-FI-3229C SPDS Computer
Neutron Flux	X-C55-NE-35 X-C55-NI-35B X-C55-NE-36 X-C55-NI-36B X-C55-NE-48 X-C55-NI-48 X-C55-NR-45

TABLE 2CATEGORY 2 INSTRUMENTS

<u>Variable</u>	<u>Instrument Number</u>
RHR/LHSI Flow	X-E11-FT-605A X-E11-FI-605A X-E11-FT-605B X-E11-FI-605B SPDS Computer
HHSI Flow	X-E21-FT-940 X-E21-FI-940 X-E21-FT-943 X-E21-FI-943 SPDS Computer (Unit 2)
Main Steam Flow	X-C22-FT-475 X-C22-FI-475 X-C22-FT-485 X-C22-FI-485 X-C22-FT-495 X-C22-FI-495 SPDS Computer
Containment Spray Flow	X-E13-FT-958A X-E13-FI-958A X-E13-FT-958B X-E13-FI-958B SPDS Computer (Unit 2)
Charging Line Flow	X-E21-FT-122 X-E21-FI-122A SPDS Computer

TABLE 2
CATEGORY 2 INSTRUMENTS

<u>Variable</u> (cont'd)	<u>Instrument Number</u>
Letdown Flow	X-E21-FT-150 X-E21-FI-150 SPDS Computer
CCW Heat Exchanger Inlet Flow	X-P17-FT-3043A X-P17-FI-3043AA X-P17-FT-3043B X-P17-FI-3043BA X-P17-FT-3043C X-P17-FI-3043CA
Pressurizer Pressure	X-B21-PT-455 X-B21-PI-455 SPDS Computer
RHR Heat Exchanger Discharge Temperature	X-E11-TE-606A X-E11-TR-604A X-E11-TE-606B X-E11-TR-604B SPDS Computer
Temperature of Service Water to Auxiliary Building	X-P16-TE-3003A X-P16-TI-3003A X-P16-TE-3003B X-P16-TI-3003B

b. Discussion and Conclusion

The licensee was well prepared for the inspection and extremely cooperative in providing assistance to the inspector. All documentation, drawings, and calibration data sheets were immediately available. Knowledgeable engineers were assigned to provide assistance, answer questions, and assist in plant walkdowns.

The inspector concluded that Farley has implemented a satisfactory program to meet the intent of RG 1.97, the SERs, and their submittals, except for a few minor weaknesses in the areas of quality assurance documentation and the calibration program. In another area, spare leads in electrical cabinets were not properly taped or labeled "spares". A brief discussion of the areas reviewed and the results, the weaknesses, and the licensee's planned actions are summarized below.

(1) Calibration

The inspector reviewed the latest calibration data sheets for those RG 1.97 instruments and loops identified in Tables 1 and 2. The inspector noted that loop calibrations are performed and this is considered a strength in the licensee's program. However, a weakness involving the calibration of three Category 1 variables was identified.

The three variables, T hot, T cold, and RCS pressure, have their signals transmitted to the inadequate core cooling monitor (ICCM) system from the instrument loops. The RCS pressure has four loops which transmit signals to the SPDS computer and the ICCM system. Both T hot and T cold have three loops where the signals are transmitted to a temperature recorder, the SPDS computer, and the ICCM system. In each loop, the signals to the SPDS computer and recorder are loop calibrated. The ICCM system is calibrated as a separate instrumentation system with simulated signals while the loop signals are disconnected. There is no overlap testing performed as recommended in IEEE Standard 338, IEEE Standard Criteria for the Periodic Testing of Nuclear Power Generating Station Safety System. However, the licensee does require that a channel check be performed for these ICCM signals. The licensee stated that in order to enhance the effectiveness of the procedures, the I&C surveillances will include ICCM computer point verifications to be performed during the next refueling outages. The inspector considered this as a reasonable and acceptable method for correcting the calibration weakness.

(2) Recorders

During the review of the RG 1.97 Category 1 system checklists, the inspector noted that several display devices were not classified as "Q". [Q meaning full equipment qualification]. In the "System Checklist" for each variable, the licensee specifically identified the Seismic Analysis for the MCB (main control board) and the Indicator Test Report. These were reviewed by the inspector and found acceptable. However, the inspector was concerned with recorders LR-459 for the pressurizer level and LR-476 for the S/G narrow range level. The licensee stated that their submittal does not take credit for the recorders being RG 1.97 displays and the seismic qualification was not applied. However, as an enhancement, based on availability, LR-476 will be replaced during the next refueling outage and LR-459 at the second refueling outage for each unit. This was considered reasonable and satisfactory by the inspector since the licensee had already placed the order for LR-476 prior to this inspection.

(3) Quality Assurance

As previously stated, the inspector reviewed the RG 1.97 System Checklist for each variable. During this review, the inspector noted that for Quality Assurance, the licensee referenced the FNPIMS [Farley Nuclear Plant Information Management System] instead of the Q-list. The licensee explained that the FNPIMS has an inventory data base which is considered part of the Q-list for QA requirements. The FNPIMS did not contain any reference to RG 1.97 for the instrumentation. The licensee agreed and stated FNPIMS will be upgraded, as an enhancement, to incorporate RG 1.97 as a review requirement and ensure all Category 1 and 2 variables are included. This upgrade is expected to be completed by the end of October 1990. This upgrade is considered acceptable by the inspector.

(4) Electrical Spare Leads

In several of the nonsafety-related process instrumentation cabinets, the inspector identified that several spare leads were not properly capped (taped) and/or labeled as "spares". In addition several terminal block covers were not installed. These items were located in Unit 1 Cabinet 8 and Unit 2 Cabinets 5 and 8. In several instances the bare copper conductor could be seen through the overlapped tape. When advised of these conditions, the licensee immediately took appropriate corrective action.

The licensee stated that two additional types of corrective action would be implemented. Electrical and I&C personnel will be trained to label and properly cap spare leads. Periodic walkdown inspections of electrical cabinets will be performed to ensure spare leads are labeled and properly capped. The inspector considered this proposed corrective action as reasonable and adequate.

(5) Interfaces

The inspector reviewed the electrical drawings and confirmed that interfaces between safety-related and nonsafety-related instrument circuits were through qualified isolation devices. The safety-related part of the circuit consisted of the sensor up to and including the isolator. The indicators and recorders in the circuit (loop) were considered by the licensee as being nonsafety. This was consistent with the licensee's submittal on RG 1.97.

3. Exit Interview

The inspection scope and results were summarized on August 15, 1990, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report.

The licensee stated that the following corrective actions will be taken in response to the inspection finding:

- ° As an enhancement, Alabama Power Company will, based on availability, replace with qualified recorders LR-476 (S/G Level) during the next refueling outage and LR-459 (pressurizer level) during the second refueling outage for each unit.
- ° As an enhancement, Alabama Power Company will upgrade its FNPIMS (inventory data base) program to incorporate RG 1.97 as a review requirement (for QA) and ensure all RG 1.97 instrumentation for Category 1 and 2 variables is included. This will be expected to be completed by the end of October 1990.
- ° Alabama Power Company will upgrade the current I&C calibration and surveillance procedures to ensure that the T hot, T cold, and RCS pressure signals to the ICCM system will be verified by the loop calibration method. This will be completed and performed during the next refueling outages for both units.
- ° Appropriate corrective action, including training and walkdown inspections, will be performed to ensure spare leads are identified and properly capped.

The inspector stated that the licensee's program met the intent of RG 1.97, the SERs, and their submittals.

4. Acronyms and Initialisms

EQ	-	Environmental Qualification
Farley	-	Joseph N. Farley Nuclear Plant
FI	-	Flow Indicator
FR	-	Flow Recorder
FT	-	Flow Transmitter
FNPIMS	-	Farley Nuclear Plant Information Management System
HHSI	-	High Head Safety Injection
I&C	-	Instrumentation and Control
ICCM	-	Inadequate Core Cooling Monitor
LHSI	-	Low Head Safety Injection
LI	-	Level Indicator
LR	-	Level Recorder
LT	-	Level Transmitter
NE	-	Neutron Element (detector)
NI	-	Neutron Indicator (power)
NR	-	Neutron Recorder (power)
NRC	-	Nuclear Regulatory Commission
PI	-	Pressure Indicator
PR	-	Pressure Recorder
PT	-	Pressure Transmitter
QA	-	Quality Assurance
Q-list	-	Equipment Qualification List
RCS	-	Reactor Coolant System
RG	-	Regulatory Guide
RHR	-	Residual Heat Removal
SER	-	Safety Evaluation Report
S/G	-	Steam Generator
SPDS	-	Safety Parameter Display System
TE	-	Temperature Element
TI	-	Temperature Indicator
TR	-	Temperature Recorder