



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

Report Nos.: 50-348/89-12 and 50-364/89-12

Licensee: Alabama Power Company
600 North 18th Street
Birmingham, AL 36291

Docket Nos.: 50-348 and 50-364

License Nos.: NPF-2 and NPF-8

Facility name: Farley 1 and 2

Inspection Conducted: May 11 - June 10, 1989

Inspection at Farley site near Dothan, Alabama

Inspectors: *G. F. Maxwell* 6/26/89
G. F. Maxwell, Senior Resident Inspector Date Signed

W. H. Miller, Jr. 6/26/89
W. H. Miller, Jr., Resident Inspector Date Signed

Approved by: *F. S. Cantrell* 6/24/89
F. S. Cantrell, Section Chief Date Signed

SUMMARY

Scope:

This routine onsite inspection involved a review of operational safety verification, monthly surveillance observation, monthly maintenance observation, licensee event reports, design changes and modifications, plant startup from refueling, and proper receipt, storage and handling of emergency diesel fuel oil.

Results:

Within the areas inspected, no violations or deviations were identified. Certain tours were conducted on deep backshift or weekends, these tours were conducted on May 18, June 2 and 10 (deep backshift inspections occur between 10 p.m. and 5 a.m.).

The licensee has installed in Unit 2 a N-16 gamma detection system on the main steam lines. This is an enhancement to the plant's leak rate monitoring program and improves ability to detect a steam generator tube leak.

REPORT DETAILS

1. Licensee Employees Contacted

R. G. Berryhill, Systems Performance and Planning Manager
C. L. Buck, Plant Modification Manager
L. W. Enfinger, Administrative Manager
R. D. Hill, Assistant General Manager - Plant Operations
D. N. Morey, General Manager - Farley Nuclear Plant
C. D. Nesbitt, Technical Manager
J. K. Osterholtz, Operations Manager
L. M. Stinson, Assistant General Manager - Plant Support
J. J. Thomas, Maintenance Manager
L. S. Williams, Training Manager

Other licensee employees contacted included, technicians, operations personnel, maintenance and I&C personnel, security force members, and office personnel.

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

2. Plant Status

Unit 1

Unit 1 operated at approximately 100% reactor power throughout the reporting period.

Unit 2

Unit 2 cycle 6-7 refueling outage continued into this reporting period. The unit returned to power operation on May 21.

On May 22 at 10:19 a.m. the reactor tripped due to low-low level in the 2A steam generator. Steam generator feed pump 2A tripped when a loosely connected speed pickup/thrust bearing wear cable was bumped. The unit was returned to power operation on May 22 at 11:34 p.m.

On May 27 at 9:06 a.m. the reactor tripped due to a turbine generator trip from a ground occurring in the exciter. This resulted in the failure of the No. 9 exciter bearing. The unit was returned to power operation at 8:21 p.m. on May 31.

3. Operational Safety Verification (71707, 92700)

a. Plant Tours

The inspectors conducted routine plant tours during this inspection period to verify that the licensee's requirements and commitments

were being implemented. Inspections were conducted at various times including week-days, nights, weekends and holidays. These tours were performed to verify that: systems, valves, and breakers required for safe plant operations were in their correct position; fire protection equipment, spare equipment and materials were being maintained and stored properly; plant operators were aware of the current plant status; plant operations personnel were documenting the status of out-of-service equipment; there were no undocumented cases of unusual fluid leaks, piping vibration, abnormal hanger or seismic restraint movements; all reviewed equipment requiring calibration was current; and general housekeeping was satisfactory.

Tours of the plant included review of site documentation and interviews with plant personnel. The inspectors reviewed the control room operators' logs, tag out logs, chemistry and health physics logs, and control boards and panels. During these tours the inspectors noted that the operators appeared to be alert, aware of changing plant conditions and manipulated plant controls properly. The inspectors evaluated operations shift turnovers and attended shift briefings. They observed that the briefings and turnover provided sufficient detail for the next shift crew and verified that the staffing met the TS requirements.

Site security was evaluated by observing personnel in the protected and vital areas to ensure that these persons had the proper authorization to be in the respective areas. The inspectors also verified that vital area portals were kept locked and alarmed. The security personnel appeared to be alert and attentive to their duties and those officers performing personnel and vehicular searches were thorough and systematic. Responses to security alarm conditions appeared to be prompt and adequate.

Selected activities of the licensee's Radiological Protection Program were reviewed by the inspectors to verify conformance with plant procedures and NRC regulatory requirement. The areas reviewed included: operation and management of the plant's health physics staff, "ALARA" implementation, radiation Work Permits (RWPs) for compliance to plant procedures, personnel exposure records, observation of work and personnel in radiation areas to verify compliance to radiation protection procedures, and control of radioactive materials.

b. Plant Events and Observations

(1) Loss of Main Feedwater Flow

On May 22 Unit 2 experienced a reactor trip while operating at about 34% reactor power. The event was reported to the NRC Duty Officer as required by 10 CFR 50.72. The inspectors evaluated the circumstances and conditions which existed prior to and following the reactor trip. The trip resulted from loss of the "A" steam driven main feedwater

pump (the B" pump was not running at that time). Loss of this main feedwater pump allowed steam generator levels to drop to the low-low steam generator reactor trip setpoint. Initial investigation by the licensee indicates that the main feedwater pump trip was probably caused by a loose electrical connector associated with the speed pickup and thrust bearing wear circuit on the turbine end of the pump. Housekeeping activities were being conducted in the area near the loose connector when the pump tripped. It appears that possibly someone may have accidentally brushed against the electrical cable which had the loose connector, thus causing an electrical discontinuity to the turbine speed pickup and thrust bearing wear circuit; resulting in a pump trip. The cable and loose connector were both tested. The tests indicated that the connector was loose enough to allow circuit discontinuity when the cable was moved. The connector was then properly fastened and the circuit was returned to full service. About an hour after the event occurred the plant was returned to power operation. The licensee documented the event on incident report 2-89-202 in accordance with administrative procedure AP-30 and is continuing the evaluation.

(2) Loss of Public Prompt Notification System

On May 24, the NRC Duty Officer was notified about a problem which Houston County had experienced with the public notification system. Initially the licensee reported that the off site tone alert radio system was inoperable from 4:00 p.m. on May 23 until 11:45 a.m. on May 24. Further inquiry by the licensee had revealed that this was a mis-communication and that actually the tone alert radio system was probably not inoperable for longer than just a few minutes. Also the licensee reported that from about 1:00 p.m. on May 23 until about 4:00 p.m. on May 24 the off site siren repeater was inoperable, due to damage during a thunderstorm.

The licensee reported the event to the NRC on May 24 at about 11:45 a.m. Licensee personnel stated that they were made aware of the inoperable status of the public notification system only minutes before contacting the NRC. The licensee is evaluating the conditions surrounding the notification system inoperable status and the delay by the Houston County officials to promptly report the condition to the licensee.

The event was documented by the licensee on Incident Report 1-89-201 and is still under evaluation.

(3) Loose Parts from Unit 2 Turbine Driven Auxiliary Feedwater Pump

After performing various startup test following the Unit 2 refueling outage, the turbine driven auxiliary feedwater pump seized on May 16 due to loose broken metal pieces from the pump diffuser. The pump was disassembled and two fragments from the auxiliary feedwater pump

diffuser turning vane were not recovered. The fragments were approximately 2 1/4" by 23/32" by 1/4" and 9/16" by 23/32" by 1/4" in size and may have entered the discharge piping of the auxiliary feedwater system. The licensee performed evaluations to determine the potential effects of these loose parts on the feedwater system and the means required to either locate and remove the loose parts or the results anticipated if the parts could not be located. Procedure 2-EIP-1035, Turbine Driven Auxiliary Feedwater System Flow Test to Determine Possible Effects from Loose Parts in System, was issued to perform flow tests and inspect sections of the piping system including the flow restrictors for evidence of the loose parts. However, the loose parts were not found.

Westinghouse performed an evaluation of the problem (Reference No. ES 89-1463) and determined that the presence of these loose objects on the secondary side of the steam generator were not expected to result in an increased probability of a steam generator tube rupture. Also, the safety margin as defined in the TS bases for maintenance of the reactor coolant pressure boundary integrity was not expected to be reduced.

The inspectors observed the licensee's performance of portions of Procedure 2-ETP-1035 and surveillance tests of the turbine driven auxiliary feedwater pump following repairs. The pump met the TS performance requirements following repairs and the personnel appeared to adhere to the inspection and test requirements of Procedure 2-ETP-1035. The inspectors also reviewed the evaluations on this problem and had no further questions on this item.

(4) Loss of Main Turbine Generator Excitation Voltage

On May 27, Unit 2 experienced a reactor trip while operating at about 88% reactor power. The reactor trip resulted from the main turbine generator tripping. The turbine trip was caused by loss of excitation voltage for the main generator. The licensee evaluated this condition and determined that it appears to have been caused by the number nine turbine bearing and the permanent magnet for the exciter becoming excessively hot. This bearing and the exciter permanent magnet were both physically installed on the south end of the main turbine adjacent to the generator exciter. The inspectors were informed by licensee personnel that the bearing and the exciter permanent magnet became excessively overheated as a result of the static electricity generated while the generator was rotating. The effects of this static charge would not have normally affected the bearing or other adjacent equipment or parts. However, during the most recent Unit 2 outage the main turbine generator had maintenance activities conducted on the exciter end of the generator. During that time it appears that an insulator was not installed on one of the bearing lubricating lines which were connected to the number nine bearing. This allowed the static electrical charge to have a heating affect on the bearing and to the adjacent exciter permanent magnet.

The bearing and the permanent magnet became damaged by the heat. Thus resulting in loss of power to the exciter for the main turbine generator.

Following the reactor trip the bearing was replaced, the insulators were correctly installed on the bearing lubricating lines, the exciter's permanent magnet was repaired, and the turbine generator was returned to service.

The licensee reported the event to the NRC Duty Officer and documented it on Incident Report 2-89-203 in accordance with administrative procedure AP-30 and is continuing the evaluation.

No violations or deviations were identified. The results of the inspections in this area indicate that the program was effective with respect to meeting the safety objectives.

4. Monthly Surveillance Observation (61726)

The inspectors witnessed the licensee conducting maintenance surveillance test activities on safety-related systems and components to verify that the licensee performed the activities in accordance with TS and licensee requirements. These observations included witnessing selected portions of each surveillance, review of the surveillance procedures to ensure that administrative controls and tagging procedures were in force, determining that approval was obtained prior to conducting the surveillance test and the individuals conducting the test were qualified in accordance with plant-approved procedures. Other observations included ascertaining that test instrumentation used was calibrated, data collected was within the specified requirements of TS, any identified discrepancies were properly noted, and the systems were correctly returned to service. The following specific activities were observed:

| | |
|--------------|---|
| 2-STP-5.0 | Full Length Control Rod Operability Test |
| 1-STP-9.0 | Reactor Coolant System Leak Rate Test |
| 1-STP-11.0 | RHR Pump 1A Quarterly IST |
| 1-STP-22.16 | Turbine Driven Auxiliary Feedwater Pump Quarterly IST |
| 2-STP-22.16 | Turbine Driven Auxiliary Feedwater Pump Quarterly IST |
| 2-STP-29.2 | Cycle 7 Shutdown Margin Calculation (TAVG 5470F) |
| 2-SOP-37.1C | Switching Battery Charger 2B |
| 2-STP-35.1 | Unit 2 Startup TS Verification |
| 2-STP-41.4 | Power Range Functional Test Channel N-44 |
| 0-STP-80.1 | Diesel Generator 1B Operability Test |
| 0-STP-80.2 | Diesel Generator 2C Operability Test |
| 2-STP-80.1 | Diesel Generator 2B Operability Test |
| 2-STP-80.14 | Diesel Generator "A" Train Loss of Off Site Power Test |
| 2-STP-80.15 | Diesel Generator "B" Train Loss of Off Site Power Test |
| 0-STP-227.14 | Functional Test of Control Room Ventilation Isolation (R-35B) |

Test 2-STP-80.14 conducted May 16 was satisfactory, except the breaker to CCW "swing" pump 2B (breaker BF05) did not close in the test. Pump 2B was aligned to the B train at the time of this test. The licensee checked the jumpers installed for the test to assure correct installation and conducted a retest of this breaker. The breaker closed satisfactorily during the retest.

The surveillance test of diesel generator 2B on May 15 resulted in an administrative slow start from the use of the air start header No. 2. The diesel started in 10.56 seconds. The maximum TS limit is less than 12 seconds. This engine previously experienced an administrative slow start on the No. 1 air header during the surveillance conducted on March 15, 1989. Work orders have been issued to investigate and correct the slow start problems.

5. Monthly Maintenance Observation (62703)

The inspectors reviewed the licensee's maintenance activities to verify the following: maintenance personnel were obtaining the appropriate tag out and clearance approvals prior to commencing work activities, correct documentation was available for all requested parts and material prior to use, procedures were available for all requested parts and material prior to use, procedures were available and adequate for the work being conducted, maintenance personnel performing work activities were qualified to accomplish these tasks, no maintenance activities reviewed were violating any limiting conditions for operation during the specific evolution, the required QA/QC reviews and QC hold points were implemented, post-maintenance testing activities were completed, and equipment was properly returned to service after the completion of work activities. Activities reviewed included:

| | |
|--------------|---|
| MWR 18707C | Repair fuel oil leak on No. 1 cylinder to diesel generator 1B. |
| MWR 200040 | Disassemble electric motor to circulating water pump 2B, repair oil leak, clean motor and stator and reassemble. |
| MWR 2000069 | Repair Unit 2 turbine driven auxiliary feedwater pump. |
| WA-W00306767 | Perform quarterly inspection on diesel generator 1B using procedures: MP-12.3 Diesel Air Start System, and MP-14.6, Model PC2V Diesel Generator Quarterly Inspection. |

6. Licensee Event Reports (92700, 90714)

The following Licensee Event Reports (LERs) were reviewed for potential generic problems to determine trends, to determine whether information included in the reports meet the NRC reporting requirements and to consider whether the corrective action discussed in the reports appear appropriate. The Licensee action was reviewed to verify that the events were reviewed and evaluated by the licensee as required by the technical specifications; that corrective action was taken by the licensee; and that safety limits, limiting safety setting and LCOs were not exceeded. The

inspector examined the incident reports, logs and records, and interviewed selected personnel. The following reports are considered closed:

Unit 1

LER/89-01 Special Report: Fire doors inoperable for more than seven Days
 LER/89-02 Special Report: Fire doors inoperable for more than 7 days

Unit 2

*LER/89/01 TS Ac for Statement Requirement Not Met for Inoperative Fire Protection System Due to Personnel Error
 LER/89-02 Special Report: Fire Doors Inoperable For More Than 7 Days
 *LER/89-04 Containment Integrity Breach Caused By Personnel Error
 LER/89-05 Personnel Error Causes of Engineered Safety Feature Equipment
 LER/89-06 Special Report: Containment Hatches Were Non-functional as Fire Barriers For Longer Than 7 Days

*NOTE: These LERs are closed since violations 348,364/89-07-01 and 348,364/89-11-01 have been issued on these discrepancies. The licensee's corrective actions on these report's and violations will be reviewed during subsequent NRC inspections.

No violations or deviations were identified. The results of the inspections in this area indicate that the program was effective with respect to meeting the safety objectives.

7. Design Changes and Modifications (37828) - Unit 2

The inspectors evaluated two plant design changes which were implemented during this outage for Unit 2. The details for these modifications were described in the control packages for Plant Change Notices (PCN) B-87-2-3976 and PCN B-88-2-5213. PCN B-87-3976 provided the controls and authorization to allow the installation of a new analog/digital total AFW flow indicator on the Unit 2 main control board. PCN B-88-2-5213 authorized the installation of a new radiation monitoring system in Unit 2 main steam valve room to detect possible primary to secondary leaks.

The inspectors noted that the design change packages contained details that considered: 10 CFR 50.59 applicability; safety evaluation; applicable FSAR sections; codes, standards and regulations; and, equipment environmental qualification requirements. The design verifications required various design reviews. Each package provided sufficient verification signatures to show that the reviews were conducted.

The inspectors observed the installed condition of the auxiliary feedwater total flow indicator and noted that the new meter has been placed into the surveillance test program. The surveillances which are conducted on it are controlled by STP-209.4, Total Flow Loop Q1N23FI3229 Loop Calibration.

The new flow control circuit has the capability of providing an input to the plant safety parameter display console system.

The inspectors observed parts of the in process installation and the completed installation of the secondary main steam valve room leak monitoring system. The inspectors were informed that this system is a current industry method used for monitoring possible primary to secondary leaks. The system was designed to detect N-16 gamma radiation that would be present in the event of a steam generator tube leak. The system detectors are near each of the main steam generator steam headers before the main steam relief valves. A recorder, indicators and annunciators have been provided to alert the control room operators should a leak be detected by this system.

No violations or deviations were identified. The installation of the N-16 gamma secondary system leak detection system is considered an enhancement for the plant leak rate monitoring program. This new system will provide the unit with the ability to rapidly assess a steam generator tube leak.

8. Plant Startup From Refueling (71711) - Unit 2

Following the refueling outage the inspectors observed the licensee implementing the various system lineups required by procedure FNP-2-UOP-1.1P, Startup of Unit from Cold Shutdown to Hot Standby and FNP-2-UOP-1.2, Startup from Hot Standby to Minimum Load. Completed system lineup checklists were evaluated to verify that the restoration program was being implemented.

The accessible portions of the Unit 2 high head safety injection system were walked down by the inspectors to verify: valves and electrical breakers were in correct alignment, hangers and supports were made up correctly, major components were properly labeled and lubricated, and no visible leakage existed.

No violations or deviations were identified. The results of the evaluation of the overall restoration program and the walkdown of the high head injection system indicates that the licensee's program was effective in this area.

9. Proper Receipt, Storage and Handling of Emergency Diesel Generator Fuel Oil (TI 2515/100)

Temporary Instruction 2515/100 required followup to verify that the licensee has a program in place to purchase and store fuel oil that meets the requirement of the technical specifications. The inspectors reviewed the licensee's diesel fuel oil receipt and storage program and verified that the licensee: routinely determined the quality of stored fuel oil by scheduled analysis; can detect degradation of stored fuel quality; routinely monitors and cleans filters, strainers and other components

prone to fouling in the fuel oil system; and reviews and evaluates NRC information on fuel oil problems, i.e., NRC Information Notices and Bulletins.

In general, the licensee's program was adequate to assure that the fuel oil for the emergency diesel generators met the requirements of the TS. However, the licensee's program does not include several of the elements addressed in the questionnaire to the temporary instruction. These items were forwarded to NRC Region II on May 25, 1989 for review. No further followup action on these items is required by the resident inspectors at this time.

The residents reviewed a random sample of 19 completed "Certificate of Analysis" on the receipt of diesel fuel oil performed between April 1988 and March 1989. Six of the analyses indicated that the diesel fuel had a heating value less than that specified in the FSAR. FSAR 9.5.4.1 states that the diesel fuel will have a heating value higher than 19,000 Btu/lb. The deficient sample dates, Btu/lb rating and source from which analyses were taken are as follows:

| <u>Sample Date</u> | <u>Source Description</u> | <u>Btu/lb</u> |
|--------------------|--------------------------------|---------------|
| 2-2-89 | Vendor truck 125 Tanker 472 | 18,850 |
| 2-2-89 | Vendor Truck 80 Tanker 462 | 18,841 |
| 11-30-88 | Vendor Truck 72 S-2630-53 | 18,771 |
| 11-30-88 | Vendor Truck 72 S-2630-52 | 18,814 |
| 10-19-88 | Vendor Truck 34888 Tanker 2520 | 18,979 |
| 9-21-88 | Vendor Truck 80 Tanker 462 | 18,970 |

The licensee's preliminary investigation of this finding indicates that in the event of the worst design base accident, which is a dual unit loss of off-site power with a loss of coolant accident in one unit, two large and one small diesel generators will be required. Sufficient fuel will be available from four of the five underground diesel fuel storage tanks to run these three emergency diesels for at least seven days as required by the FSAR. The licensee is continuing the evaluation and stated in the exit interview that by August 1, 1989 a copy of any necessary proposed FSAR change with appropriate safety evaluation report will be provided to the resident inspectors. This is identified as Inspector Followup Item 348,364/89-12-01.

No violation were identified in the areas inspected.

10. Exit Interview

The inspection scope and findings were summarized during management interviews throughout the report period and on June 9, with the plant manager and selected members of his staff. The inspection findings were discussed in detail. The licensee acknowledged the inspection findings and did not identify as proprietary any material reviewed by the inspection during this inspection.

Licensee was informed that the items discussed in paragraph 6 were closed.

| <u>ITEM NUMBER</u> | <u>DESCRIPTION AND REFERENCE</u> |
|--------------------|---|
| 348,364/89-12-01 | Inspector Followup Item: Further Evaluation by the Licensee of the Btu/lb Requirements for Emergency Diesel Fuel Oil - Paragraph 9. |

11. Acronyms and Abbreviations

| | | |
|--------|---|--|
| AFW | - | Auxiliary Feedwater |
| AOP | - | Abnormal Operating Procedure |
| AP | - | Administrative Procedure |
| APCO | - | Alabama Power Company |
| CFR | - | Code of Federal Regulations |
| CCW | - | Component Cooling Water |
| DC | - | Design Change |
| DR | - | Deviation Report |
| ECP | - | Emergency Contingency Procedure |
| EIP | - | Emergency Plant Implementing Procedure |
| EQ | - | Environmental Qualifications |
| ESF | - | Engineered Safety Features |
| EWR | - | Engineering Work Request |
| F | - | Fahrenheit |
| GPM | - | Gallons Per Minute |
| ISI | - | Inservice Inspection |
| IST | - | Inservice Test |
| LCO | - | Limiting Condition for Operation |
| MOV | - | Motor-Operated Valve |
| MOVATS | - | Motor-Operated Valve Actuation Testing |
| MWR | - | Maintenance Work Request |
| NCR | - | Nonconformance Report |
| NRC | - | Nuclear Regulatory Commission |
| NRR | - | NRC Office of Nuclear Reactor Regulation |
| PMD | - | Plant Modifications Department |
| QA | - | Quality Assurance |
| QC | - | Quality Control |
| RCP | - | Radiation Control and Protection Procedure |
| RCS | - | Reactor Coolant System |
| RHR | - | Residual Heat Removal |
| SI | - | Safety Injection |
| SAER | - | Safety Audit and Engineering Review |
| S/G | - | Steam Generator |
| SSPS | - | Solid State Protection System |
| SOV | - | Solenoid Operated Valve |
| STP | - | Surveillance Test Procedure |
| SW | - | Service Water |
| TS | - | Technical Specification |
| TSC | - | Technical Support Center |
| WA | - | Work Authorization |