



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

Report Nos.: 50-335/92-17 and 50-389/92-17

Licensee: Florida Power and Light Company
 9250 West Flagler Street
 Miami, FL 33102

Docket Nos.: 50-335 and 50-389 License Nos.: DPR-67 and NPF-16

Facility Name: St. Lucie 1 and 2

Inspection Conducted: July 20-24, 1992

Inspectors: M. Miller 8/11/92
 M. Miller Date Signed

R. Moore 8/11/92
 R. Moore Date Signed

Accompanying Personnel: S. Rudisail

Approved by: M. B. Shymlock 8-14-92
 M. B. Shymlock, Chief
 Plant Systems Section
 Engineering Branch
 Division of Reactor Safety Date Signed

SUMMARY

Scope:

This special announced inspection was conducted to assess the adequacy of the licensee's corrective actions for safety- significant NRC findings identified during the EDSFI (NRC Report Nos. 50-335/91-03 and 50-389/91-03).

Results:

The licensee's response to the EDSFI findings was fully satisfactory. EDSFI Findings 91-03-01, 91-03-02, 91-03-03, 91-03-05, 91-03-06, 91-03-07 and 91-03-08 were closed based on a review of the licensee's corrective actions. Findings 91-03-04 and 91-03-09 did not require any corrective action as these findings were identified as positive attributes. Other items identified during the EDSFI and discussed in the report were also resolved.



REPORT DETAILS

1. Persons Contacted

- *G. Boissy, Plant General Manager
- *J. Brady, Mechanical Maintenance Superintendent
- *B. Dawson, Maintenance Manager
- *B. Dean, Electrical Maintenance Department Head
- *J. Dyer, Quality Control Supervisor
- *H. Gavankar, Production Engineering Manager
- J. Hoge, Site Electrical I&C Engineering Supervisor
- *J. Holt, Licensing Engineer
- *J. Husmer, Director, Nuclear Engineering
- *L. Leon, Protection and Control Coordinator
- *G. Madden, Engineering Licensing Manager (Acting)
- *H. Paduano, Engineering Technical Programs Manager
- *R. Raldiris, Nuclear Engineering Electrical Supervisor, PEG
- *T. Roberts, Engineering Manager
- *D. Sager, Plant Vice President
- *D. Smith, Chief Electrical Licensing Engineer
- *M. Smith, Protection and Control Supervisor
- *J. Voorhees, Quality Assurance Supervisor
- *D. Wolf, Site Engineering Supervisor

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

Other NRC Employees:

- *S. Elrod, Senior Resident Inspector
- *R. Carrion, Regional Inspector
- *M. Shymlock, Plant Systems Section Supervisor
- *F. Wright, Regional Inspector

* Attended Exit Meeting

Acronyms and initialisms used throughout this report are listed in paragraph 5.

2. Electrical Distribution System Follow-up Inspection (2515/111)

This inspection assessed the adequacy of the licensee's corrective actions for both safety significant findings and other items identified during the EDSFI conducted February 19-22, March 4-8, and March 18-22 and documented in NRC report number 50-335/91-03 and 50-389/91-03.

Overall, the licensee's response to the EDSFI findings was good. The follow-up activities exceeded NRC requirements in that team concerns which were not explicitly identified as findings were addressed by the licensee as well as those issues documented as findings. Each item was identified via the Corrective Action Report process. Responsibilities were assigned, actions tracked, and issues appropriately resolved for these CARs. The following paragraphs discuss the EDSFI items reviewed by the inspectors during this inspection.

a. Finding 91-03-01 - Start-up Transformer Sharing

The start-up transformer sharing concern was discussed in paragraph 2.3 of the EDSFI report. The EDSFI team noted in the updated FSARs in Sections 8.2.1.3 and 8.2.1.5 for Units 1 and 2 respectively that if a start-up transformer of either unit were to be removed from service a manual switching arrangement was provided which permitted paralleling the 4.16 kV electrical distribution systems of both units. Note 2 on EBASCO One Line Diagram, 2998-G-275, Sheet 19, 4.16 kV Switchgear No. 2AB, No. 2A4, and No. 2B4 implied that a single start-up transformer was not capable of supporting both units' loads and the switchgear rating would be exceeded in the event of a current fault.

The Unit 2 Updated FSAR stated that should it be necessary for one start-up transformer to supply 4.16 kV power to both units, appropriate operating procedures were developed to assure that the start-up transformer was not overloaded. Contrary to the foregoing, the licensee stated to the EDSFI team that the procedures did not exist. Furthermore, the licensee stated that it was not their intention to operate the station using one start-up transformer to supply both units.

The inspectors verified that the licensee implemented appropriate corrective action to assure that administrative controls were in place to control start-up transformer loading should the need arise. The inspectors reviewed Unit 1 FSAR, Chapter 8, Amendment 10 and Unit 2 FSAR, Chapter 8, Amendment 7 that have been added as a result of this finding. Both amendments discuss the loading restrictions for using one start-up transformer to supply both units. Both amendments specifically stated that "operating procedures will be developed to assure that the start-up transformer is not overloaded should an accident condition arise".

In addition, the licensee revised Ebasco One Line Diagram 2998-G-275, Sheet 19, Revision 1 by document change request DCR No. SLE-92-307, Revision 0, dated July 22, 1992. NOTE 2 was revised to clarify the loading of the start-up transformer and associated switchgear for buses 2AB, 2A4, and 2B4. The NOTE 2 included the requirement that "operating procedures" needed to be developed before implementing use



of one start-up transformer to supply both units. The inspectors reviewed the corrective action requests, CAR No. 052891 and CAR No. N-91-07, which implemented these changes. The corrective action taken by the licensee was appropriate; this item is closed.

b. Design Documentation Errors - Class 1E 125 VDC System

The Class 1E 125 VDC system documentation, calculations, and evaluations which demonstrate sizing and loading were discussed in paragraph 2.6 in the EDSFI report. The EDSFI team identified several minor documentation errors. There was no operability concern with these minor errors. However, the licensee stated their intent to investigate and correct the errors.

The inspectors reviewed the documentation discussed below that contained the minor errors and verified that the licensee performed the appropriate corrective action for the following minor errors. EDG 1A control panel loads on the calculation did not agree with FSAR Table 8-3-4 and inverter loads on Table 1 of the calculation did not agree with Attachment 9 of the calculation. The licensee initiated PC/M documents to correct the FSAR and corrected the calculation to reflect the correct inverter loads. The battery short circuit current on calculation EC-034-EC039 did not agree with vendor correspondence. The licensee resolved this discrepancy by incorporating the vendor recommended value.

Finally, the EDSFI team identified inconsistencies between MOV full load current on drawing 2998-G-275-SH3 and calculation FLO-124-37-5000. To correct this issue, the licensee issued CAR No. N-91-018 to ensure that voltage drop calculations would be considered prior to replacing MOV motors and appropriate drawings were corrected. The inspector concluded adequate corrective actions had been accomplished for each of these documentation errors.

c. Finding 91-03-02 - DC MOV's Undersized Cable

The DC MOV's undersized cable finding was discussed in paragraph 2.6.2 of the EDSFI report. The EDSFI team identified that the DC motor operated valves could be required to function toward the end of the battery loading cycle when the battery voltage dropped to 105 VDC. The results of the licensee's MOV voltage calculations indicated that the motor terminal voltage minus the cable voltage drop due to minimum current draw were below the vendor recommended values. In addition the cable sizes were smaller than the recommended sizes. The vendor comments for Unit 1 calculations indicated the MOV motors would perform satisfactorily. However, the vendor comments for Unit 2 MOVs were not received.



The EDSFI team was concerned since Unit 2 was built several years later, vendor recommendations for cable sizing may have changed, therefore the Unit 1 calculation comments may not be applicable to Unit 2. The EDSFI team stated there was no operability concern with MOV cable sizing. However, the licensee should assure that the cables which were not sized to vendor recommendations are not stressed further as a result of future changes.

The inspectors reviewed calculations and data for the Unit 2 MOVs to determine if the cables would support adequate current for the MOVs to operate at reduced voltage. Five calculations, PSLs/1-00028, PTNS/1-00029, PSL-2FJM-91-048, PSL-1-JE-90-002, and PSL-1-JE-90-003 were reviewed by the inspectors to verify that at minimum voltage (well below the minimum battery voltage of 105 VDC) adequate thrust and torque was available to operate the MOVs. The inspectors verified that the adequate voltage was available to operate the MOV motors with minimum battery voltage and the anticipated voltage drop in the cable. Further, the inspectors reviewed additional corrective action taken by the licensee to ensure replacement MOV motors would be either identical or be evaluated by engineering before being issued for use. The inspectors considered the corrective action taken by the licensee to be appropriate. This EDSFI item is closed, however further evaluations for MOVs per Generic Letter 89-10 will continue to be addressed by the NRC.

d. Lack of Calculation to Support Ground Grid Design

The ground grid design was discussed in paragraph 2.7 of the EDSFI report. The EDSFI team identified that the licensee did not have a calculation to support the ground grid design. The licensee agreed to produce a design calculation to justify the design of the grounding grid as per the guidelines established in IEEE-80.

The inspectors reviewed EBASCO calculation No. EC 204, Station Ground Calculations, Revision 0, dated May 2, 1991. This calculation established that the requirements of IEEE-80 had been satisfied for the existing ground grid. The licensee's corrective action resolved the EDSFI team concern regarding grounding grid calculations.

e. Leak Detection Capability for Underground Fuel Oil Piping

Addressed in Section 3.2 of the EDSFI report, this item was related to a team recommendation for increasing the frequency of the IST program testing with the intent of improving the plant capability to identify leakage in the diesel fuel oil transfer system. The licensee elected not to implement this recommendation based on the existence of other mechanisms which are equally effective in leak identification. The



existing mechanism was the monitoring and trending of fuel oil storage tank inventory. The effectiveness of this mechanism has been demonstrated by the identification of previous system leaks. For example, a leak was identified in 1988 and again in July 1992, indicating that the sensitivity to leak detection was equal to the sensitivity achievable by increased IST hydrostatic test frequency. The inspector concluded the existing leak detection capability, via inventory monitoring, was adequate and the NRC concerns regarding this issue were resolved.

f. **EDG Fuel Oil System Procedure Enhancements**

Section 3.2 of the EDSFI Report noted 2 examples in which procedure enhancements would improve the guidance provided for EDG fuel oil system activities. The first example involved the 18 month periodic test which verified train cross connect operability between storage tanks and day tanks. The procedure did not specify which cross connect configurations would be tested to verify the TS requirements. The applicable procedures, OP 1-040050, revision 27, OP 2-040050, Revision 12, Periodic Integrated Test of the Engineered Safety Features, had been revised to specify the tested cross connect configurations.

The second procedure enhancement was related to the fuel oil chemistry sampling procedure C-05, Diesel Fuel Oil Inventory, Receiving Shipments, and Periodic Sampling. The procedure did not provide acceptance criteria for cloud point which was specific to the plant geographic location. Revision 17 to this procedure provided the specific acceptance criteria for this chemistry parameter. The licensee actions on these two issues adequately resolved the EDSFI concern regarding fuel oil system procedures.

g. **EDG Fuel Oil System Documentation Deficiency**

This item, addressed in section 3.2 of the EDSFI report, was associated with a deficiency related to the fuel oil transfer system head loss calculations. The Unit 2 calculation was inaccurate and no head loss calculation existed for Unit 1. The licensee revised the Unit 2 calculation, PSL-2-FJM-91-005, Revision 2, and developed the applicable calculation for Unit 1, PSL-1-FJM-91-004, Revision 1. The calculations verified system parameters met manufacturer's specifications for the pumps. The licensee's actions resolved this EDSFI issue.

h. EDG Support System Relief Valves Not In Preventive Maintenance Program

EDSFI Report section 3.3 noted 2 examples in which support system reliability could be enhanced by entering relief valves into the preventive maintenance program. The starting air compressor relief valves and the EDG cooling water expansion tank relief valves were not on a schedule for maintenance or testing. The licensee has revised the applicable procedure, Mechanical Maintenance Safety-Related Preventive Maintenance Program (Outage PMs), 1-M-00180, and 2-M-00180, to provide guidance for this task. The appropriate documentation was submitted to enter these tasks on the maintenance five year planning schedule. The licensee has appropriately resolved the EDSFI concern related to EDG support system relief valves.

i. FSAR Description Deficiency - EDG Air Start System

EDSFI Report section 3.3 noted a discrepancy between the FSAR air start circuit description and the as-built circuit configuration. The FSAR incorrectly stated the maximum EDG air cranking duration was five seconds as opposed to the applicable circuit drawing designation of a 9 second cranking duration. FSAR Amendment 7 was recently issued and incorporated the appropriate revision to this FSAR statement. The FSAR revision appropriately resolved this FSAR deficiency.

j. Procedure Enhancements - Loss of Ventilation to Safety-Related Electrical Spaces

EDSFI Report section 3.4 noted that specific corrective actions had not been developed to address a loss of ventilation air flow to the electrical spaces. Failure of the single main supply air duct to these spaces due to tornado or random failure could result in space ambient temperature exceeding design requirements. The licensee has revised plant off-normal procedures and annunciator summaries to include corrective measures for this situation. Review of Off-Normal Procedures, 1-0030131, Revision 47, and 2-0030131, Revision 35, demonstrated that these enhancement actions had been completed. This EDSFI issue has been adequately resolved.

k. No Automatic restart of Unit 1 Safety-Related Electrical Equipment Fans After LOOP

EDSFI Report section 3.4 noted a licensee self assessment finding which identified a potential for Unit 1 electrical equipment rooms' ambient temperature to exceed equipment design recommendations. The space fans do not restart on high space temperature therefore, following a

LOOP, restart of the fans was not assured. The licensee resolved this issue by revising the emergency operation procedures to ensure manual restart of the ventilation fans within two hours after a LOOP event. Revision 4 of 1-EOP-09, Loss of Off-site Power, implemented this corrective action. This EDSFI issue was adequately resolved.

l. FSAR Discrepancy - Ventilation Flow to Safety-Related Equipment Spaces

EDSFI Report section 3.4 noted a licensee self assessment issue related to an apparent discrepancy between the FSAR and design documentation. A recent ventilation flow calculation indicated that flow rates to these spaces was less than design values for provision of adequate space cooling. The licensee performed ventilation flow testing to determine actual flows. Review of test documentation verified that actual flow conditions met design requirements in most cases. The single exception variation was negligible. The licensee has adequately resolved this issue.

m. Finding 91-03-03 - EDG Room Temperature

This finding, discussed in EDSFI report section 3.4, identified the potential for high ambient space temperature in the EDG rooms when an EDG was in standby. Space ventilation was provided by a non-safety related exhaust fan when the EDG was not running and there was no temperature monitoring devices in the rooms. Licensee corrective action for this issue was the installation of ambient temperature monitoring devices and provision for periodic monitoring of space temperature and fan operability. The Senior Nuclear Plant Operator Logs were revised to include verification of temperature and fan operability every four hours. The licensee actions were adequate to resolve team concerns regarding this issue. This item is closed.

n. Long Term Storage of Test Equipment

As discussed in EDSFI report paragraph 4.2 the EDSFI team noted during a walk-down that large electrical equipment such as battery load test banks, ground testing devices and spare switchgear breakers were being stored in the vicinity of safety-related equipment. The licensee stated that a more secure area for long term storage of such equipment would be considered.

The licensee has since decided to enhance long term storage. Minor Engineering Packages have been issued for both Units 1 and 2 to provide storage areas for large electrical equipment. The MEP for Unit 1 will convert a temporary battery room into a storage area. An additional door will be added to the room to facilitate equipment movement. The



MEP for Unit 2 provides three storage areas and one seismic restraint for a tool box. The storage areas consist of steel chains and structural steel elements connected to new base plates and existing embedded steel. The licensee actions resolved the EDSFI concerns regarding this issue.

o. Finding 91-03-05 - Fuse Control Program

As discussed in EDSFI report paragraph 4.3, a fuse control program was initiated by the Electrical Maintenance Department. The EDSFI team determined that although the Electrical Maintenance Department identified the need for a fuse control program in 1988, the program had not been completed by engineering. The fuse control program was initiated after numerous fuses with incorrect ampere ratings were identified during walk-downs of the electrical distribution system. The Electrical Maintenance Department via a Request for Engineering Assistance requested a controlled document identifying fuse sizes and types for each unit. The EDSFI team agreed that the controlling document for fuses should identify fuse sizes and fuse types. Design engineering agreed that these attributes would be included in the controlled document for fuses.

The licensee has issued fuse list 8770-A-454 for Unit 1 and 2998-A-454 for Unit 2. The fuse lists provide a complete listing of fuses detailing the fuse location by component, the fuse number, channel, fuse block identification, fuse size, fuse manufacturer and alternate manufacturer, fuse model and alternate model, fuse description, vendor, fuse arrangement, and control wiring diagram drawing references. The licensee's corrective action was sufficient. This item is closed.

p. Finding 91-03-06 - Protective Relay Setting Procedures

The concern for the protective relay setting procedures was identified as Finding 91-03-06 and discussed in paragraph 4.3 in the EDSFI report. The EDSFI team reviewed the calibration procedures for the protective relays and the completed calibration data sheets. Although the relays were found to be within calibration requirements, the calibration procedures needed improvement to assure the protective relays would be properly calibrated in the future. The EDSFI team identified that the following items needed to be addressed in the calibration procedures:

- * The M&TE type by manufacturer and/or accuracy needed to be specified.
- * The "Electronic Test Box" needed to be specified by manufacturer and model number.



- * The tolerance for the input setpoint needed to be removed since all settings are digital.
- * The acceptance criteria needed to be addressed to ensure the "as left" condition will be set to prevent drift exceeding the tolerance.

The inspectors verified the licensee had revised the calibration procedures for the protective relays by incorporating the items listed above. Protection & Control System Quality Test Instructions, QTI-PS/PSL-2.2 through 2.30, were reviewed and verified as the corrected protective relay setting calibration procedures. The inspectors considered the licensee's corrective action of revising the calibration procedures was appropriate. This item is closed.

q. Finding 91-03-07 - Relay Setting Drawings

As discussed in EDSFI report paragraph 4.3 and Finding 91-03-07, the EDSFI team and licensee determined that protective relay settings were not listed on a drawing for each unit. Prior to the EDSFI the licensee developed preliminary protective relay setting drawings for each unit. The licensee stated that the drawings would be issued prior to the next refueling outage for each unit.

The inspectors reviewed and verified the licensee had issued protective relay setting drawing 8770-A-452 for Unit 1 and 2998-A-452 for Unit 2. This item is closed.

r. Finding 91-03-08 - PC/M 58-285, Relay Setting

As stated in EDSFI report paragraph 5.5 and Finding 91-03-08 the licensee performed Plant Change Modification PC/M 58-285. This modification added an additional breaker to Distribution Center 480 VAC 2A-3 to separately feed 480 VAC Power Centers 2A-2 and 2A-5 via parallel connected station service transformers. Power Centers 2A-2 and 2A-5 are in separate fire areas and prior to the PC/M were fed by one breaker. During the modification the licensee used the original settings for the breakers even though the breaker loading had changed. Although the settings were within protection guidelines for one or two transformers in parallel, the licensee agreed that the settings could be lowered as an enhancement to the protection scheme.

The licensee has issued drawing 2998-A-452 revising the settings for breakers in power center 2A-2 and 2A-5. The EDSFI team verified that this revision had been accomplished. This item is closed.

4. Exit Interview

The inspection and results were summarized on July 24, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed the inspection results. Proprietary information is not contained in this report.

5. Acronyms and Initialisms

CAR	Corrective Action Request
DCR	Drawing Change Request
DWG	Drawing
EDSFI	Electrical Distribution System Functional Inspection
EDG	Emergency Diesel Generator
EOP	Emergency Operating Procedure
FSAR	Final Safety Analysis Report
IEEE	Institute of Electrical and Electronic Engineers
IST	Inservice Testing Program
kV	Kilovolts
LOOP	Loss of Off-site Power
M&TE	Measuring and Test Equipment
MEP	Minor Engineering Package
MOV	Motor Operated Valve
OP	Operating Procedure
PC/M	Plant Change/Modification
PEG	Production Engineering Group
PM	Preventive Maintenance
PSL	Plant St. Lucie
TS	Technical Specification
VAC	Volts Alternating-current
VDC	Volts Direct-current