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

Report Nos.: 50-335/85-19 and 50-389/85-19

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 8-12, 1985

Inspectors: L. E. Foster — 8/9/85
L. Foster, Team Leader — Date Signed

N. Merriweather — 8/9/85
N. Merriweather — Date Signed

for R. E. Conlon — 8-13-85
R. Brewer — Date Signed

Consultant: R. L. White, Lawrence Livermore National Laboratory

Approved by: T E Conlon — 8-13-85
T. E. Conlon, Section Chief — Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This special, announced inspection involved 140 inspector-hours at the site concerning licensee response to Generic Letter 83-28, Required Actions Based on General Implications of Salem Anticipated Transient Without Scram (ATWS) Events. Areas inspected included: post trip review; equipment classification; vendor interface and manual controls; post maintenance testing; and reactor trip system reliability.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*K. N. Harris, Site Vice President
*C. O. Woody, Vice President Nuclear Operations
*D. A. Sager, Plant Manager
*J. Scarola, Assistant Superintendent, Electrical Maintenance
B. Adams, Planning Supervisor
B. Korte, Electrical Supervisor
*A. Bailey, QA Operations Supervisor
B. Mayhew, Electrical Supervisor
*J. Krumins, Site Supervising Engineer
G. Schweppe, Chief Electrician
M. Latimer, Electrician
D. Tannis, Electrician
D. Howard, QC Inspector
*N. Roos, QC Supervisor
*L. Pearce, Operations Supervisor
M. Flannigan, Senior Plant Technician, Electrical
J. Bowen, GEMS Planner, Electrical
J. Sutton, GEMS Planner, Electrical
D. Wolf, I&C Supervisor
*C. Leppla, I&C Supervisor
T. Rogers, Assistant Plant Technician
B. Haller, Senior Document Technician

Other licensee employees contacted included engineers, technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

*R. V. Crlenjak, Senior Resident Inspector
*H. E. Bibb, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on July 12, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

Inspector Followup Item 389/85-19-01, Inadequacies During Breaker Maintenance Demonstration, paragraph 9.

Unresolved Item 335,389/85-19-02, Technical Manual Control, paragraph 8.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved Items are matters about which more information is required to determine whether they are acceptable or may involve a violation or deviation. A new unresolved item identified during this inspection is discussed in paragraph 8.

5. Background

In February 1983, the Salem Nuclear Power Station experienced two failures of the reactor trip system upon the receipt of trip signals. These failures were attributed to Westinghouse - Type DB-50 reactor trip system (RTS) circuit breakers. The failures at Salem on February 22 and 25, 1983, were believed to have been caused by a binding action within the undervoltage trip attachment (UVTA) located inside the breaker cubicle. Due to problems of the circuit breakers at Salem and at other plants, NRC issued Generic Letter 83-28, Required Actions Based on Generic Implications of Salem ATWS Events, dated July 8, 1983. This letter required the licensees to respond on immediate-term actions to ensure reliability of the RTS. Actions to be performed included development of programs to provide for post trip review, classification of equipment, vendor interface, post maintenance testing, and RTS reliability improvements. The licensee responded to Generic Letter 83-28 by correspondence dated August 11, 1983, November 8, 1983, November 30, 1983, and March 1, 1984. This inspection was performed to review the licensee's current program, planned program improvements, and implementation of present procedures associated with post trip review, equipment classification, vendor interface, post maintenance testing, and reactor trip system reliability for St. Lucie Units 1 and 2.

6. Post Trip Review

The inspector reviewed the licensee response to Generic Letter 83-28, L-83-554, dated November 8, 1983, which described their program for post trip review. Their response described the following program:

> Florida Power and Light Company maintains a program to ensure that unscheduled reactor shutdowns are analyzed and to ensure that a determination is made that the plant can be safely restarted. The

program is described in Operating Procedure (OP) 0030119. Prior to reactor restart this procedure requires that the cause of the trip has been identified, that no abnormal conditions exist, and that the Plant Supervisor and the Shift Technical Advisor agree that the plant can be safely returned to power. The program provides methods and criteria for comparing a post trip transient to expected plant response. When the cause of a plant trip cannot be positively determined, the events associated with the trip are evaluated by the Facility Review Group prior to returning the unit to power. The main source of post trip information is the Sequence of Events Recorder (SER). Numerous analog variables are continuously recorded on strip charts in the control room. The Safety Assessment System (SAS) is currently being installed in Unit 1 and will be installed in Unit 2 during its first refueling outage. Installation of the SAS should greatly increase the amount and quality of post trip information.

The inspector conducted a review of the following licensee procedures:

OP 0030119, Post Trip Review, Revisions 0, 1, and 2

Administrative Procedure (AP) 0005725, Duties and Responsibilities of the Shift Technical Advisor, Revision 6

Off-Normal Operating Procedure 2-0030131, Annunciator Summary, Revision 1

In House Event (IHE) Report 85-12, Unit #1 Trip of March 7, 1985

A review was conducted to determine the adequacy of implementation of OP 0030119 for reactor trips occurring on the following dates:

Date	Unit	Time
1/29/84	2	7:13 a.m.
2/9/84	2	10:20 a.m.
5/14/84	1	5:21 a.m.
6/26/84	1	10:02 a.m.
7/26/84	1	3:13 a.m.
8/23/84	1	8:16 a.m.
8/30/84	2	1:56 p.m.
9/14/84	1	9:44 a.m.
11/19/84	2	12:42 p.m.
11/19/84	2	3:37 p.m.
11/21/84	2	9:29 a.m.
12/19/84	2	11:36 a.m.
12/19/84	2	11:54 p.m.
3/7/85	1	10:08 a.m.

During the review, discrepancies were identified in the implementation of OP 0030119. The discrepancies were indicative of a lack of supervisory involvement in the post trip review process. Discussions with licensee personnel revealed that they had identified several other discrepancies and had taken action to improve the effectiveness of the procedure. Subsequent to March 1985, the licensee determined that a revision to OP 0030119 was required to eliminate these discrepancies and to improve the procedure. On June 26, 1985, revision 2 of the procedure was approved. Since June, neither unit has tripped and consequently, the licensee's implementation of the revised procedure will be evaluated during subsequent routine inspections. However, revision 2, if properly implemented, should result in an improvement in the post trip review program. Since the licensee recognized these discrepancies and had taken corrective actions to correct these deficiencies, this is not considered a violation.

The discrepancies identified in the implementation of OP 0030119 prior to March 7, 1985 are summarized below:

a. Section 2, Reactor Trip Actuation:

The reason for the Unit 1 manual trip on May 14, 1984, is listed as, "trip rest of rods". The entry does not explain why some rods are apparently already tripped and it does not address why the manual trip was necessary. A review of other records revealed that half of the control rods dropped to the core bottom due to loss of electrical power. The reason for the manual trip was actually to correct the resulting abnormal control rod configuration.

The reactor trips of Unit 1 on August 23, 1984, and March 7, 1985, are both identified as resulting from "loss of load". In actuality, both of these trips were initiated by unintentionally opening trip circuit breakers (TCBs) 1, 4, 5 and 8 during reactor protection system logic matrix testing. These four TCBs, when opened, caused all control rods to fully enter the core. Consequently, the reactor was tripped prior to actuation of the logic matrix due to loss of turbine load. The loss of load signal served only to open the remaining four TCBs and had no effect on control rod position as all rods were already on the bottom.

b. Section 3, Actuation Time:

The actuation time between the initiating trip signal and the opening of the last TCB is normally about 40 milliseconds. The time recorded for the trip of Unit 1 on September 14, 1984, was only 4 milliseconds. The discrepancy was not addressed and consequently a procedural error involving the recording of the wrong trip signal initiating time went undetected. The inspector verified that the correct actuation time was 40 milliseconds.

Similarly, the recorded actuation time for the Unit 2 trip on November 19, 1984, at 12:42 p.m., was 176 milliseconds. This exceeded the normal actuation time by a factor of four and the discrepancy was not addressed. Subsequent review of the SER data revealed that a manual trip signal opened the required four TCBs in 15 milliseconds and the resultant loss of turbine load signal opened the second group of four TCBs in 28 milliseconds.

The actuation time for the Unit 2 trip on November 19, 1984, at 3:37 p.m., was not recorded because of a malfunction of the SER. The reason for the malfunction was not addressed.

c. Section 9, Secondary System Function:

The Unit 2 trip summaries for December 19, 1984, and February 9, 1984, both indicate that the feed regulating system functioned properly. During both trips the operating main feed pumps were lost and consequently no main feed entered the steam generators. The loss of main feed pump flow was an abnormal condition that did not constitute proper functioning of the feed regulating system.

d. Section 11, Reason For Reactor Trip:

The reason for the Unit 2 trip on February 9, 1984, was listed as "low steam generator water level". While this was the protection signal that activated the trip logic matrix, this entry sheds no light as to why the steam generator low level setpoint was reached. Loss of main feed pumps caused the low steam generator level.

The reason for the Unit 1 trip on May 14, 1984, is listed as "improper parallel of MG sets". The mechanism by which this action resulted in the opening of the TCBs is not addressed. The motor generator set which was improperly placed in service was not identified.

The reason for the Unit 1 reactor trip on September 14, 1984, is listed as "had to trip 1B1 circ pump due to high D/P across screen". Section 2 of the procedure identified the reactor trip as manually initiated. However, the SER indicated that the turbine generator was manually tripped, resulting in a loss of load signal which tripped the reactor via the protection logic matrix. Consequently, the reactor trip was automatic, not manual, and the reason for the manual turbine trip was to protect the turbine and condenser during reduced circulating water flow.

e. Section 12, Unusual Conditions During Trip:

No unusual conditions were identified during the reactor trip of May 14, 1984. However, prior to this manual trip, half of the control rods had dropped to the core bottom due to a power supply problem. This unusual condition was not addressed in the report.

f. Section 16, Maintenance Required Prior to Returning to Power:

For the Unit 1 reactor trip on May 14, 1984, the entry indicates that no maintenance was required prior to returning to power. The cause of the trip was related to the improper paralleling of a motor generator set. The need to troubleshoot the electrical system for the affected motor generator set was not addressed.

No entry was made indicating whether maintenance was required prior to returning to power following the Unit 1 trip of July 26, 1984. Maintenance was required to determine why the steam bypass control system did not fully function and why five steam generator safety relief valves lifted.

For the Unit 2 trip on November 19, 1984, at 12:42 p.m., the entry indicated that no maintenance was required prior to returning the unit to power. However, a fault in the C condensate pump motor resulted in tripping the 4160 volt bus tie breaker between buses 2A2 and 2A3. The need to determine the status of the pump and breaker had not been annotated.

For the Unit 2 trip on November 19, 1984, at 3:37 p.m., the entry indicated that no maintenance was required prior to returning the unit to power. However, the cause of the trip was attributed to a high startup rate spike in an electrical circuit. The troubleshooting activities performed to determine that the problem was spurious had not been annotated. The failure of the SER to print trip times for channels MB, MC, and MD was not addressed.

For the Unit 2 trip on November 21, 1984, the maintenance section did not identify the need to determine why several spare contacts printed on the SER printout. Additionally, the SER printout did not indicate the status of the number eight TCB or loss of load channel MD following the reactor trip signal. The need to address the status and accuracy of the SER was not annotated.

For the Unit 2 trip on December 19, 1984, at 11:36 a.m., the maintenance section did not identify the need to determine why startup transformer breaker 2B4 tripped on overcurrent, why the auxiliary transformer breaker 2B2 did not open as required, and why generator lockout breaker 8W52 cycled prior to remaining open.

For the Unit 2 reactor trip on December 19, 1984, at 11:54 p.m., the maintenance section did not address the need to repair a main feed pump discharge valve breaker that tripped on overload.

The Unit 1 reactor trip on March 7, 1985, was related to personnel error during the termination of the reactor protection system logic matrix test. The test was being terminated prior to completion because TCB number five could not be closed due to an apparent problem with its undervoltage device. The need to repair the TCB was not addressed.

These discrepancies appear to be indicative of a lack of attention to detail by the Shift Technical Advisor (STA) and Nuclear Plant Supervisor (NPS) when completing the post trip review procedure. Since the procedure required no post completion review, the discrepancies went undetected by senior supervisory personnel. The discrepancies relating to documentation of maintenance activities, may indicate insufficient communications between the operations and maintenance departments.

Prior to this inspection, the licensee determined that OP 0030119 should be improved to provide additional information during the post trip review process. On June 20, 1985, the Facility Review Group reviewed revision 2 to OP 0030199 which the Plant Manager approved on June 26, 1985. Revision 2 is an improved procedure that requires the compilation of more post trip transient information for review and analysis. The areas in which revision 2 exceeds the requirements of previous revisions are noted below:

Initial plant conditions are more clearly addressed. The STA will identify the status of the plant, status of the power operated relief block valves, status of important control stations, any off-normal status of safety systems, any test surveillances in progress during the transient, and initial reactor power.

The reactor protection system actuation time is specified to be a maximum of 43 milliseconds. This acceptance criteria enhances the STA's awareness of unusually long or short actuation times.

The status of the pressurizer code safety valves, the main steam code safety valves, and the power operated relief valves during and after the transient are addressed. If any of these valves opened during the transient, the STA must document the method utilized to confirm that the valves subsequently closed.

Any system control stations that were operated in the manual mode are identified along with the time when automatic control was secured. Any manual actions taken by the operations staff are itemized.

Plant radiological response is addressed. Any area or process radiation monitoring alarms received are itemized and addressed.

For complicated transients, or situations where the SER fails, handwritten statements are collected from the operations personnel on duty during the event. The procedure contains guidelines as to the type of information desired. The names of persons directly involved with the event are recorded to supplement the ability to obtain additional information.

The STA summarizes the transient by writing an itemized event description, indicating the sequence of key events. The NPS or his assistant reviews and signs this scenario, certifying concurrence.

A preliminary safety assessment is performed addressing whether important safety paramcters remained within expected norms. The norms are clearly specified. The maximum and minimum values for reactor coolant temperature and pressure are recorded, as well as for pressurizer and steam generator level.

Plant transient behavior is compared to expected behavior by comparing chart recorded data with that previously obtained or supplied by the vendor. A file of In. House Events is available for this purpose, as well as transient depictions contained in the safety analysis report and Combustion Engineering Nuclear Training Volume 128 (CEN 128). Any differences between transients must be explained.

Each system or component which performed inadequately during the transient is required to be itemized along with a description of the problem. The corrective actions taken as a result of the reactor trip are summarized along with corrective actions taken as a result of system and component problems.

The reactor restart can only be authorized by the Plant Manager or his authorized designee.

On July 7, 1385, the licensee approved revision 6 of AP 0005725, Duties and Responsibilities of the Shift Technical Advisor. Attachment 2 of the procedure, entitled STA Abnormal Occurrence Report, is completed for plant abnormal occurrences, including unplanned reactor trips. Included in Attachment 2 are the following good practices as they relate to post trip reviews.

The post trip review, OP 0030119, after completion, becomes an attachment to Attachment 2 of AP 0005725 and copies are routed to the STA Group Lead Engineer and the Technical Staff Supervisor for review.

As a minimum, the following stripchart records are attached to the STA Abnormal Occurrence Report:

- Reactor Power
- Pressurizer Pressure
- Pressurizer Level
- Average and Reference Temperature
- Reactor Coolant Outlet Temperature (T-Hot)
- Reactor Coolant Inlet Temperature (T-Cold)
- Steam Generator Levels

The Sequence of Events printout is attached.

A detailed description of the event is written which includes: circumstances leading to the event; method of discovery; automatic actions; operator actions; and equipment failure.

Special considerations are noted such as: unexpected aspects of plant behavior; inadequate performance of systems or components; procedural deficiencies, personnel errors; or previously occurring similar events.

In addition to the pre-restart procedures discussed above, the licensee has implemented a longer term significant events review program which compiles and distributes In House Event Reports. Significant plant events, such as reactor trips, are described and discussed to emphasize lessons learned and to itemize recommendations. The reports are issued at the direction of the STA Group Lead Engineer several weeks following the event. The reports promote a better understanding of the event for those not directly involved in the transient and provide training information to the plant staff.

Equipment used to complete the post trip review primarily includes the sequence of events recorder (SER) and strip chart monitored analog variables. The SER is a change of state processing unit which can monitor up to 350 inputs. Presently 210 key plant parameters are monitored. The buffer can store approximately 300 events and the printer operates at 110 characters per second. Twelve SER printouts were reviewed during this inspection. This system is generally reliable. Malfunctions have, on infrequent occasions, prevented the SER from monitoring a reactor trip transient. To minimize this occurrence a high priority is placed on system maintenance. SER failures are detected by the operations staff by observing the annunciator SER Trouble/Failure Light mounted in each control room. Off-Normal procedures require the Instrumentation and Control Department to be promptly notified upon the receipt of the annunciator. Administrative Procedure 0010125 requires on-shift personnel to verify that the SER is functioning and to run a summary of contact status on a daily basis.

Approximately 100 stripchart recorders continuously monitor safety related parameters such as reactor coolant temperature and pressure, steam generator levels, safety injection flows, and area radiation levels. The STA reviews applicable stripcharts following a reactor trip transient. AP 0005725 requires certain stripcharts to be retained as part of the unusual event report compiled along with the post trip review.

A Safety Assessment System (SAS) has been partially installed in both units. While not completed, the system still provides the ability to record and recall fourteen hours of analog information that can supplement the information available on control room stripchart recorders. The licensee has not developed specific procedures directing use of SAS information in performing the post trip review. However, the expertise is available to retrieve desired printouts. The licensee does not plan to routinely incorporate SAS information in the post trip review process unless adequate information is unavailable from other sources.

Within the areas examined, no violations or deviations were identified.

7. Equipment Classification

The licensee was requested in GL 83-28 to confirm that all components of the reactor trip system whose function is required to trip the reactor are identified as safety-related. This identification should be on documents, procedures, and information handling systems used in the plant to control safety-related activities, including maintenance, work orders, and parts replacement. In addition, the licensee was requested to describe their program for ensuring that all components of other safety-related systems necessary for accomplishing required safety functions are also identified as safety-related on information handling systems used at the plant. The licensee's response to Sections 2.1, and 2.2 of GL 83-28 gives a detailed description of this program and procedures for safety-related equipment classification. The inspector reviewed their response, appropriate procedures, and interviewed responsible licensee personnel to confirm that the licensee's program for equipment classification was adequate and consistent with their response to GL 83-28.

The inspector examined the following procedures and documents:

Administrative Procedure No. 0010432, Plant Work Orders, Revision 25

Administrative Procedure No. 0010430, Maintenance on Nuclear Safety-Related or Seismic Class I Systems

Quality Assurance Manual No. QP-2.7, Identification of Safety-Related and Nuclear Non-Safety Related QA Required Structures, Systems, Components, and Services

Quality Instruction No. QI-2-PR/PSL-1, Quality Assurance Program, Revision 5

Maintenance Operating Procedure No. 1-0970060, Periodic Maintenance of Instrument AC System, Revision 5

Maintenance Operating Procedure No. 2-0110060, Periodic Maintenance of Control Element Assembly (CEA) Drive Equipment and Switchgear, Revision 8

Administrative Procedure No. 0005731, Electrical Maintenance Training Program, Revision 4

Quality Instruction No. QI 16-PR/PSL-1, Corrective Action, Revision 16

The inspector concluded through discussions with licensee personnel and by review of the above procedures and documents that the licensee's program for equipment classification included the following elements:

Plant and component control for classification of structures, systems, and components as safety-related were being implemented.

The licensee has developed a program to assure that safety-related or non-safety related maintenance activities are identified during the planning stage.

Personnel participating in activities impacting safety-related or non-safety related structures, systems, and components were aware of the appropriate level of QA controls.

Written directives assigned principal responsibility for satisfactory completion of procurement and maintenance activities associated with safety-related structures, systems, and components.

Personnel performing activities impacting equipment on the safety listing have received indoctrination and training.

Repairs to equipment to correct failures, malfunctions, deficiencies, deviations, defective material, and nonconformances were performed, documented, and reviewed to determine reliability of replacement components.

Section QP 2.7 of the FP&L QA Manual states that the controlling document for identification of safety-related items is the FSAR for any given operating nuclear unit. It further states that structures, systems, and components identified as nuclear safety-related are within the scope of the FP&L Quality Assurance Program. St. Lucie Quality Instruction QI 2-PR/PSL-1 implements the requirements of the FP&L QA Manual. QI 2-PR/PSL-1 outlines the scope of those activities which have been determined as requiring one or more aspects of the PSL Quality Program. This QI states that those items described in the FSAR as safety-related, seismically, or post LOCA qualified are activities which require one or more aspects of the PSL Quality Program. However, in cases where the FSAR is not definitive, the QI allows the use of other clarifying documents such as instrument lists, valve lists, piping and valve lists, P&IDs, drawings and original equipment specifications to identify safety-related, seismically, or post LOCA qualified components.

The inspector's review of the above documents verified that the licensee's described program for classifications of safety-related structures, systems, and components was in accordance with the licensee's response to GL 83-28. Discussions with responsible licensee personnel in the electrical and QC departments revealed that they were knowledgeable of the procedure requirements for the proper classification of work activities on plant work orders and were also knowledgeable of the procedures and documents used for classifying activities as safety-related or nonsafety. The inspector also reviewed records for seven completed plant work orders (PWOs) for Unit 1. The records were examined to verify that maintenance work on safety-related components had been properly classified and that all required reviews and approvals were received prior to performing work.

The records reviewed are identified as follows:

PWO	Equipment
5551	Reactor Trip Switchgear Breakers 3 and 6
4948	Reactor Trip Switchgear TCB-3
4224	Reactor Trip Switchgear
5146	Reactor Trip Switchgear TCB-3
5777	B Instrument Inverter
5769	1B/1D Instrument Inverters
5612	1B Instrument Inverter

The above records indicated that all reviews and approvals were received prior to beginning work, PWO forms were properly classified as Nuclear Safety-Related, and final records were reviewed and transferred to the records storage facility.

Within the areas examined, no violations or deviations were identified.

8. Vendor Interface and Manual Control

The inspector reviewed licensee response to GL 83-28 which described their program for vendor interface and vendor manual control. Their response described the following program:

The licensee's response dated November 8, 1983, stated that they have an equipment information program with Combustion Engineering (CE), the NSSS vendor. The system is titled "The Availability Data Program" and CE also issues "INFOBULLETINS" to licensees which give information on CE supplied systems and components. The licensee has an Operating Experience Feedback program which assures that technical data is reviewed, evaluated, and implemented into plant operations where applicable. The information received from CE is acknowledged by a return receipt.

The licensee's response dated September 7, 1983, states that FP&L is a member of the Nuclear Utility Task Action Committee (NUTAC) and would evaluate St. Lucie's capabilities for interfacing with their vendors and would supply supplemental response. This supplemental response could not be identified during this inspection.

The licensee also stated that they had not re-reviewed their current maintenance and test procedures and compared them with previously received vendor information to assure compatibility; however, they stated that all identified vendor information concerning the Reactor Trip System (RTS) switchgear have been included in appropriate test and maintenance procedures. The licensee also states in the response that all identified engineering and vendor recommendations on all other safety-related components have been included in the maintenance and test procedures. The

licensee did not state in their response nor confirm during this inspection that they had checked or re-reviewed all vendor and engineering recommendations for compatibility with current maintenance and test procedures. Discussions with licensee personnel and review of the site Corrective Action Request QC (CAR) logbook revealed that technical information from vendors and other sources had been reviewed when received, however, the inspector had no way to determine if all vendor or engineering recommendations had been received and reviewed by the site. The licensee stated that the implementation of their Operating Experience Feedback program, participation in the INPO See-In program, CE Availability Data program, and CE Owners Group program will help assure that all new information is received, evaluated, and used as applicable during the development and implementation of maintenance and test procedures.

The licensee response stated that all identified reactor trip circuit breaker modifications and maintenance recommendations have been reviewed and that FP&L procedures meet or exceed the vendor's recommendations. The licensee confirmed that all of St. Lucie circuit breakers had been refurbished by GE and that the trip shaft bearings had been replaced with bearings lubricated with Mobil 28. A review of circuit breaker maintenance procedures (1-0110060 and 2-0110060) revealed that GE recommendations had been incorporated; however, the procedures did not reference the latest GE Service Advice Letters 175-93, 9.3S, and 9.20 and the latest GE Maintenance Instruction Manual (GEI-50299E). Licensee procedures 1-0110060 and 2-0110060 reference GEI-50299A and B. It was noted that purchase order No. 6050226 under which circuit breaker serial No. 256A4002-656-38 was refurbished referenced GE Instruction 50299E instead of 50299B referenced in the licensee's procedure. Further discussions on these procedures are detailed in paragraph 10 of this report.

The licensee had procedures to control and implement vendor interface, disposition of vendor technical information, feedback of operating experiences, tracking system to ensure review, corrective action, manual retention, procurement of equipment, control of purchased equipment, and preparation of test and maintenance procedures.

Some of the licensee procedures addressing the above items are listed below. These were reviewed and discussed with the licensee.

LOI-QC-10, Vendor Interface, Revision 10

QI-2-1, Quality Assurance Program, Revision 5

QP-16.4, Tracking System

Procedure 0005724, Operation Feedback Program, Revision 5

Procedure 0010431, Preventative Maintenance Program

QI-5-1, Document Control, Revision 27

QP-4.1, Control of Requisitions and the Issuance of Purchase Orders for Spare Parts, Replacement Items, and Services

QI-16-1, Corrective Action, Revision 16

QI-17-1, Quality Assurance Records

NL-QI-2.1.3.4, Administration of the Operation Experience Feedback Program

Procedure 1400059, Reactor Protection System - Periodic Logic Matrix Test

Paragraph 5.14 of Quality Instruction 5.1 specifies how technical manuals will be changed and maintained by the vault. The inspector selected five vendor manual numbers referenced in five periodic test and maintenance procedures (1-0960061, 2-0970060, 2-110060, 1-096062, and 1-2200062) and checked these references against the manuals in the document control vault. Some of these referenced manuals were difficult to locate as the referenced numbers did not match the document filing system. Discussions revealed that in some cases, the procedures referenced the vendor number instead of the number assigned by EBASCO (EMDRACK Drawing List). Document control technicians finally tracked down some of the manuals by referring to the vendor listing and cross referencing. Manuals that could not be retrieved were: references 6.1 and 6.4 on procedure 1-0960061, revision 5; references 6.1.a and 6.1.b on procedure 1-0960062, revision 11; and reference 6.6 on procedure 1-2200062, revision 3. The reference on procedure 1-2200062 only specified "Diesel Manual" with no other identification. References 6.0 and 6.1 on procedure 2-0110060, revision 8 specify revision 0 for manual 2998-12102, whereas the manual in document control is revision 1. GEI-50299B is referenced and was found, but the latest purchase order for refurbished GE circuit breakers referenced GEI-50299E which was not in document control. Also, the GE Service Advice Letters 175-9.2, -9.3, and -9.3S were not filed with the GE Instruction Manual, although they were used during revision of Periodic Maintenance Procedure 2-0110060. QI 16, Corrective Action, revision 16 describes the method for correcting procedures, etc, but does not specify where to file or dispose of material used (vendor letters, etc.) to make changes to procedures.

Paragraph 5.14.3 of QI 5-PR/PSL-1, Revision 27 specifies that new technical manuals shall be numbered and controlled in accordance with QI 6-PR/PSL-1 and paragraph 5.14.4 specifies that revision and change status of technical manuals shall be maintained by the vault custodian or his designee. Based

on the above findings it appears that the requirements for numbering, controlling, and maintaining revision status of technical manuals are not being fully implemented as specified in QI 5-PR/PSL-1 and QI-6-PR/PSL-1. This item is considered Unresolved Item 335/85-19-02, Technical Manual Control, until further inspections of manual control in the area of numbering, referencing, tracking, and filing are made at St. Lucie.

Discussion revealed that the licensee has established a "Nuclear Vendor Technical Information and Manual Task Team" to review problems associated with obtaining, utilizing, and control of vendor information. Also, the Task Team is working on a "Draft Procedure" for the control of vendor manuals and technical information. The inspector reviewed a copy of the "Draft Procedure" and it appears that some of the above problems identified by the inspector are being addressed in this "Draft Procedure".

Within the area examined, no violations or deviations were identified.

9. Post-Maintenance Testing (Reactor Trip System Components)

St. Lucie Nuclear Power Plant, Units 1 and 2 utilize GE AK-2-25 circuit breakers for the reactor trip function. Florida Power and Light, the licensee for St. Lucie, Units 1 and 2, responded to Generic Letter 83-28 with respect to post maintenance testing of reactor trip system components by stating that they had reviewed test and maintenance procedures and "determined that current maintenance procedures provide for retest of equipment after maintenance is performed." The inspector reviewed associated procedures and observed maintenance operations and methods to confirm the licensee's response.

The licensee has several procedures that relate directly to the post-maintenance testing of the reactor trip system. These include Maintenance Procedure No. 1-0110060, Rev. 16 and 2-0110060, Rev. 8, "Periodic Maintenance of Control Element Assembly (CEA) Drive Equipment and Switchgear" for Units 1 and 2, respectively; Quality Instruction, QI 11-PR/PSL-3, Rev. 9, "Electrical Test Control;" and Quality Instruction, QI 11-PR/PSL-1, Rev. 6, "Test Control." These procedures provide the surveillance procedures, inspection requirements and other controls for the post maintenance testing. Maintenance Procedure Nos. 1-0110060 and 2-0110060 provide the specific steps for performing maintenance on the reactor trip breakers. The following documents were reviewed during this inspection:

Maintenance Procedure No. 1-0110060, Rev. 16, "Periodic Maintenance of Control Element Assembly (CEA) Drive Equipment and Switchgear." (Unit 1)

Maintenance Procedure No. 2-0110060, Rev. 8, "Periodic Maintenance of Control Element Assembly (CEA) Drive Equipment and Switchgear." (Unit 2)

Quality Instruction, QI 11-PR/PSL-1, Rev. 6, "Test Control."

Administrative Procedure No. 0010432, Rev. 25, "Plant Work Orders."

Quality Instruction, QI 11-PR/PSL-3, Rev. 9, "Electrical Test Control."

Quality Instruction, QI 11-PR/PSL-2, Rev. 11, "Mechanical Test Control."

Quality Instruction, QI 11-PR/PSL-4, Rev. 10, "Instrumentation and Control Test Control."

Quality Instruction, QI 18-PR/PSL-2, Rev. 11, "Quality Control and Surveillance"

Quality Instruction, QI 1-PR/PSL-3, Rev. 8, "Maintenance Organization."

Administrative Procedure No. 0010430, Rev. 7, "Maintenance on Safety-Related or Seismic Class I Systems."

Quality Instructions, QI 15-PR/PSL-1, Rev. 6, Non-Conforming Materials, Parts and Components."

QI 15-PR/PSL-2, Rev. 10, "Discrepancy Correction and Modification During Construction and Testing."

Maintenance Procedure No. 2-0970060, Rev. 5, "Periodic Maintenance of Instrument AC."

The licensee performed a demonstration of their (Quarterly Test) maintenance procedure on a reactor trip breaker. For this demonstration, a General Electric AK 2-25-2 circuit breaker was chosen from the plant stores as an installed breaker was not scheduled for maintenance at this time. The serial number of the breaker was S/N 256A4002-656-38. The electricians performed the maintenance procedures with one QC inspector present to provide hold point verifications. The following discrepancies were identified during procedure review and during observation of the breaker maintenance demonstration:

a. The procedure included guidelines for maintenance on Motor Generator (MG) sets and reactor trip switchgear (18 month and 4 month tests). The 18 month and 4 month tests for the reactor trip switchgear are intermingled with the inspection of MG sets.

b. The material required list did not itemize all the tools the electricians needed to perform the maintenance. Notably missing from the listing was a special manual breaker-closing tool and special wrenches. The material required listing was also for use with the CEA Motor

Generator Maintenance Procedure and thus was overly complex and lengthy. No distinction was made which tools would be used on the motor generator or which tools would be used on the switchgear (see a. above).

c. The electricians did not follow the procedure steps in the sequence as written. The effect of this is that obtaining "as found" conditions or data would not be possible and was not obtained during this demonstration. Discussions were held with the licensee concerning the advantages of following the optimum sequences. The licensee stated that if the sequence has an effect then a note is placed at the beginning of the procedure indicating that the sequence is to be followed. This maintenance procedure did not have a sequence stamp or note, thus the technicians were not required to perform the job in sequential order. The inspectors pointed out that certain steps in the procedure had to be in sequence, otherwise, correct information is not obtained. For example, as found readings for pickup voltage, dropout voltage, under voltage trip time, and trip shaft torque were invalid due to improper sequence.

d. Detailed Section 9.2.2.V.12 of the maintenance procedure 2-0110060 says in part; "If any of the above checks indicate breaker problems, make adjustments as specified in Section 9.2.2.W.9 of this procedure. If test results are still unacceptable, perform Section 9.2.2.W.9 again." Section 9.2.2.W.9 covers a multitude of steps necessary to make adjustments to the undervoltage relay to change the relay's coil pickup voltage. The section also states that after the relay has been adjusted the "pickup voltage should be re-checked with three quick measurements." During the demonstration, the undervoltage coil test did not meet specification. As a result, the electricians made adjustments to the undervoltage relay but did not turn to Section 9.2.2.W.9 to follow the required steps, nor did they make the required three quick voltage measurements as required by the procedure. He only took one measurement.

e. The electricians removed the arc chutes although nowhere in the procedure is there a step for removing or re-installing the arc chutes.

f. Section 9.2.2.V.13 of the procedure is not clear. This section calls for checking all connections for tightness. The procedure does not state if these are electrical or mechanical connections. This step also appears to be out of sequence.

g. Section 9.2.2.V.15 calls for a "Before" and "After" reading. The lack of clarity of what readings should be recorded and when to be taken caused confusion between the electricians. As a result, as found readings for pick up voltage, drop out voltage, and trip shaft torque were not obtained.

h. Section 9.2.2.V.17 calls for measurements to be "made with a feeler gauge inserted through the side of the frame." The electricians made the measurements with a sheet of shim stock cut so as to be inserted into the top of the undervoltage relay. The procedure did not allow for or mention alternate ways of making this measurement. If alternate methods may be used the procedures should so state and in the case of using shim stock the procedure should allow for a proper check of shim stock size. Burrs (resulting from scissor cut) had not been removed from the 0.005 inch shim stock; therefore, the shim thickness was 0.0065 to 0.0075 inches in the area of the burrs. The licensee was advised of this thickness discrepancy and of the possibility of the burrs cutting the coil or wiring insulation.

i. Section 9.2.2.V.18 calls for checking an adjustment to within approximately 1/32 of an inch. To make this measurement the electricians taped a "1/32" drill bit to the undervoltage relay. The procedures do not call for attaching any tool to the breaker nor do they call for the removal of any such tool to ensure that a tool has not been inadvertently left in or attached to the breaker.

j. A Plant Work Order (PWO) was written to perform the above maintenance procedure. This PWO #286224 allowed for the use of a spray coolant or heat gun to achieve required undervoltage coil temperature. This variation to procedure was written into the section of the PWO normally filled out by a planner in coordination with a supervisor. The electricians used a spray coolant to lower the coil temperature to an acceptable range. The licensee was unable to provide information showing that the use of this coolant spray or heat gun (if it had been used) will not have a detrimental effect on the circuit breaker.

k. Quality Control involvement was minimal as their only function was to verify "Hold Point" requirements. Adequacy of work station, use of correct tools, and adherence to procedure did not appear to concern QC or to be under QC surveillance.

The above items, plus several others which were discussed with the licensee, raises concerns regarding the preparation, review, approval, and implementation of procedures. The inspector was advised that the procedures were being rewritten to provide more detail and to make them clearer. The intent of the rewriting is to make it easier for the electricians to follow procedures and stay within the limits of the procedure. The licensee also stated that the electricians performing the demonstration were not the electricians who regularly perform the maintenance on these breakers; therefore, they were not fully knowledgeable of the procedure. The licensee was advised that due to the circumstances (quickly planned demonstration, regular electricians not available, and that the breaker required a retest prior to installation) that these discrepancies would be classified as Inspector Followup Item (IFI) 389/85-19-01, Inadequacies During Breaker

Maintenance Demonstration. Licensee corrective actions including the procedure rewrite, technical review, overall QC coverage of maintenance activities (not just checking hold points), training of personnel performing maintenance activities, use of correct (specified) tools, and strict adherence to procedures will be followed by NRC.

The inspector also observed the performance of a Periodic Maintenance of Instrument AC. This work was detailed in Maintenance Procedure No. 2-0970060, Revision 5. The equipment being maintained were the isolimeter, maintenance bypass switch, and inverter. As the electricians conducted the maintenance procedure one procedural inadequacy was observed by the inspector. This involved the sequence steps to discharge the capacitors. To perform maintenance, inspection, and cleaning of the isolimeter it was necessary for the electricians to discharge a bank of capacitors. The sequential steps in the procedure allowed the electricians to work on or near the inverters prior to discharging the capacitor bank. The note to "discharge capacitor banks" should be included before work is performed on or near any of the capacitor banks associated with the isolimeter or the inverter. This concern of proper sequential steps was discussed with cognizant personnel and the licensee agreed to evaluate this concern along with the previous identified concerns discussed in the above Inspector Followup Item.

Florida Power and Light has several procedures relating to post maintenance tests on safety-related equipment. Administrative Procedure No. 0010430, Revision 7, "Maintenance on Nuclear Safety-Related or Seismic Class 1 Systems" provides general guidelines on maintenance of nuclear safety-related systems, components, and equipment. The procedure assigns responsibilities and general instructions for initiating a plant work order for maintenance on safety-related equipment.

Administrative Procedure No. 0010432, Revision 25, "Plant Work Orders" defines the use of PWOs for maintenance and post maintenance testing on plant safety-related equipment.

Quality Instruction 11-PR/PSL-1, Revision 6, "Test Control" has the purpose of assuring that all testing is identified and performed in accordance with written procedures. This procedure assigns the Quality Control staff the responsibility for surveillance of the testing program.

Each maintenance department has a Quality Instruction which delineates the methods and type of tests to be performed on the associated equipment for that department. The Instrument and Control Test Control Instruction is Quality Instruction QI 11-PR/PSL-4, the Mechanical Test Control Instruction is Quality Instruction QI 11-PR/OSL-3, and the Electrical Test Control Instruction is Quality Instruction QI 11-PR/PSL-3. The inspector reviewed these procedures to ascertain that a program for post maintenance activities and testing had been established.

In addition, the inspector also reviewed several PWOs from the mechanical maintenance section, the I&C maintenance section, and the electrical section. The plant work orders reviewed are listed below:

Document No.	Equipment
4742	2A CEA MG Set and Switchgear Semi-Annual PM
5343	V-3481 Shutdown Cool. Isol. - Corrective Maintenance
4745	2C ICW PP Motor Annual PM
3206	"B" Charging Pump Corrective Maintenance
3189	Valve 2554 Corrective Maintenance
3184	Valve FCV 3306 Corrective Maintenance
7467	Annunciator A-37 Corrective Maintenance
7463	V-505, RCP Controlled Bleedoff Corrective Maintenance
7451	HCV 09-113 Corrective Maintenance
7445	Fuel Pool Area RC 26-12 Corrective Maintenance

As a result of the review and observation of procedures, PWOs, and maintenance activities the inspector concluded that the post maintenance testing program for safety-related equipment as required in Section 3.2 of Generic Letter 83-28 is satisfied.

Within the areas inspected, no violations or deviations were identified.

10. Reactor Trip System Reliability

a. Surveillance Testing of the Diverse Reactor Trip Functions of the Reactor Protection System

The licensee states in their response to GL 83-28 that on-line functional testing of the diverse trip features, including the breaker undervoltage and shunt trip features, are performed at least monthly in

accordance with Operating Procedure 140059, Reactor Protection System Periodic Logic Matrix Test. The inspector reviewed the above procedure for both Units 1 and 2 and confirmed that the procedure independently test the undervoltage and shunt trips on the reactor trip breaker. The test records for the periodic logic matrix testing performed on Unit 2 during the last six months were reviewed and found to be acceptable.

b. Trending of Reactor Trip System Components

In a letter dated January 7, 1985, NRR requested FPL to provide additional information concerning St. Lucie's program for trending reactor trip breaker components. The licensee stated in their response dated November 8, 1983 response to Generic Letter 83-28, that they would trend trip torque and breaker trip time. However, it was not clear in their response whether the breaker trip time was for a shunt trip or undervoltage trip. Therefore, NRR requested the licensee to trend the following for parameters:

1) breaker response time
2) dropout voltage for under voltage trip attachment
3) trip torque
4) breaker insulation resistance

The inspector reviewed the licensee's response dated November 8, 1983 for item 4.2 of Generic Letter 83-28 and verified that the licensee's current maintenance procedure (0110060) required the measuring of trip torque on the breaker and undervoltage trip response time. Minor discrepancies were identified with the maintenance procedure and were discussed with the licensee and are identified in paragraph 9 of this report. Further discussions with cognizant licensee personnel revealed that a program is being developed to trend trip shaft torque, undervoltage trip time, and undervoltage pickup voltage on a quarterly basis. Trending is done on a quarterly basis because preventive maintenance is scheduled every quarter on the reactor trip breakers. As of the date of this inspection two data inputs have been made into the trending program. However, this program is not consistent with the guidelines provided by NRR in their Request For Additional Information. NRR recommended that the licensee incorporate breaker insulation resistance and undervoltage dropout voltage for trending in addition to breaker response time and trip force measurements. The inspector informed the licensee of this concern. However, in reviewing this matter further, the inspector learned that the licensee's response to the NRR Request For Additional Information dated January 7, 1985 is still pending. The licensee later contacted NRR and committed to have their response submitted by July 22, 1985.

Within the area examined, no violations or deviations were identified.