U.S. NUCLEAR REGULATORY COMMISSION

REGION 2

Docket No:	50-302
License No:	DPR-72
Report No:	50-302/96-15
Licensee:	Florida Power Corporation
Facility:	Crystal River 3 Nuclear Station
Location:	15760 West Power Line Street Crystal River, FL 34428-6708
Dates:	October 6 through November 2, 1996
Inspectors:	R. Butcher, Senior Resident Inspector T. Cooper, Resident Inspector W. Bearden, Reactor Inspector, paragraphs M8.1, M8.2 G. Hopper, Reactor Inspector, paragraph O5.1 W. Miller, Reactor Inspector, paragraphs F1.1, F1.2, F8.1, F8.2
Approved by:	K. Landis, Chief, Projects Branch 3 Division of Reactor Projects

EXECUTIVE SUMMARY

Crystal River 3 Nuclear Station
NRC Inspection Report 50-302/96-15

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a four week period of resident inspection; in addition, it includes the results of announced inspections by two reactor inspectors and one reactor engineer from Region II.

Operations

A Non-Cited Violation (NCV 50-302/96-15-04) was identified for failure to translate design requirements properly for the final design of the Emergency Feedwater Initiation and Control system. (paragraph O2.2)

The licensee's requalification program complied with the requirements of 10 CFR 55.59 for the areas inspected. The development and administration of the simulator portion of the operating test was considered a strength of the program. (paragraph O5.1)

Four unauthorized tests were dispositioned as additional examples of Violation B in Part I for the Notice for EA 95-126. Unresolved Item (URI 50-302/96-04-08) is closed. (paragraph O8.1)

Maintenance

A Violation (VIO 50-302/96-15-01) was identified for failure to perform a required Technical Specification surveillance test for the Remote Shutdown System. (paragraph M8.1).

The licensee has experienced several unplanned power reductions due to poor reliability of Balance of Plant equipment. Although some of these problems are the result of equipment design, other problems associated with circulating water debris filters were caused by previous maintenance practices. (paragraph M8.2)

The work planning and scheduling department's decision to delay repairs to an EDG jacket coolant temperature switch, DJ-8-TS, is identified as a weakness. No problems were identified during the performance of the surveillance tests. (paragraph M3.2)

Engineering

An Inspector Follow-Up Item (IFI 50-302/96-15-03) Actions Taken to Resolve Recriticality Concerns, is opened to track the plant specific corrective actions for post-accident recriticality concerns. (paragraph E2.1)

Plant Support

The licensee demonstrated positive action in the resolution of the Thermo-Lag issue. The installation of the Mecatiss fire barriers was of high quality. Continuous FPC oversight of the installation process provided assurance that

the completed installation met the design and construction requirements. (paragraph F1.1)

A Violation (VIO 50-302/96-15-02) was identified for the failure of the reactor coolant pump motor oil collection system to retain oil leaking from reactor coolant pump motor D. (paragraph F1.2)

Report Details

Summary of Plant Status

The unit begin this inspection period in Mode 5. The plant originally shutdown on September 2, 1996 due to low turbine lube oil pressure. The unit outage was extended in order to resolve potential Unreviewed Safety Questions concerning emergency diesel generator loading concerns and Emergency Feedwater (EFW) system single failure vulnerabilities. On October 4, 1996, the licensee notified the NRC that they planned to remain shutdown for an extended period of time in order to make modifications to several safety systems in order to obtain additional safety margin for accident conditions.

I. Operations

O2 Operational Status of Facilities and Equipment

O2.1 Tropical Storm Josephine (71707)

On October 7, 1996, a tropical disturbance in the Gulf of Mexico was classified as a Tropical Storm and named Josephine. The weather information at 5:00 a.m. was that Josephine was moving in an ENE direction and was expected to make landfall during the night. At 7:00 a.m. the Shift Supervisor on Duty performed a shift brief in accordance with procedure Emergency Plan Implementing Procedure EM-220, Violent Weather, because the plant was in a Tropical Storm Warning area.

At 8:48 a.m. the licensee received notification from the State Warning Point that Tropical Storm Josephine was expected to strengthen to a Category 1 hurricane and that hurricane warnings were in effect for the west coast of Florida including the CR-3 site. Emergency Plan Implementing Procedure EM-202, Duties of the Emergency Coordinator, requires the declaration of an Unusual Event when in a Hurricane Warning. At 9:10 a.m. the NRC duty officer was notified of the Unusual Event (Event No. 31105). The resident inspector was also notified at this time. The licensee's Storm Team met at 9:30 a.m. and reviewed the storm preparations required by Emergency Plan Implementing Procedure EM-220.

At 11:00 p.m. on October 7, 1996 the National Weather Service canceled all hurricane warnings for Florida. The licensee exited the Unusual Event at that time.

At 12:00 a.m. the licensee measured the Ultimate Heat Sink level at 97.00 feet elevation. Normal mean high tide at CR-3 is 92 feet. Due to the proximity to the elevation of the switchyard (which is 98 feet) and possible unstable power supply, the licensee elected to place the in service B decay heat removal system on the B Emergency Diesel Generator (EGDG). The A train Engineered Safeguards equipment (which was not operating) was left on the normal switchyard source. This was accomplished at 12:28 a.m. There was no flooding or other damage experienced. At 5:10 a.m. on October 8, 1996 the B EGDG was secured.

O2.2 Emergency Feedwater Initiation Control Design Problem

a. Inspection Scope (37550, 71707, 92901)

The licensee identified a problem with the design of the compensator modules for the Emergency Feedwater Initiation and Control (EFIC) system. Following the completion of the licensee's Operability Concerns Resolution, the inspectors performed a review of the licensee's actions.

b. Observations and Findings

On May 24, 1996, the licensee determined that during some transient conditions in which all reactor coolant pumps are tripped and EFIC is in automatic control with the 2 to 8 minute fill rate control, the controls may not function as designed at the 130 inch switchover point from the low range instrumentation to the high range instrumentation. The licensee ran tests in the simulator and determined that level may increase no further in automatic and may require the control valves to be placed in manual until level is above the switchover level.

Testing of three compensator modules and control modules, identical to those installed in the Emergency Feedwater system, demonstrated that on some compensation modules, there is a significant decrease in control valve demand when the switchover to high range occurs. The licensee concluded that the potential exists, in some cases, when control valve position and valve demand is low that the valves may shut off due to the voltage discontinuity perturbation that occurs in the compensation module analog switch when voltage input approaches and reaches the level switchover setpoint. In some compensation module analog switches, the demand signal voltage to the control module decreases when approaching the switchover setpoint. Then, as switchover occurs, the voltage returns to the expected values. The control module reacts to this as an actual, sudden rise in level and drives valve position toward closed. If valve demand is initially low, the switchover may close valves sufficiently to decrease level, resulting in a cycle at the 130 inch switchover setpoint.

The licensee completed an Operability Concern Resolution Evaluation Report per Compliance Procedure CP-150, Identifying and Processing Operability Concerns, on September 25, 1996. This Operability Concerns Resolution concluded that the system was operable and operating within its design basis.

TS Bases B3.3.11 states that when a minimum of two EFIC channels recognize the loss of all Reactor Coolant Pumps, EFIC automatically actuates EFW and control level to approximately 65% in the Once Through Steam Generator (OTSG). The licensee has interpreted this statement in the TS Bases to mean that only the initiation is required to be automatic, that manual control of level is acceptable. The Operability Concerns Resolution states that the automatic fill rate to the Natural Circulation setpoint is a functional objective, not a functional requirement. This conclusion is based on information in the licensee's

Enhanced Design Basis Document.

FSAR Chapter 10.5, Emergency Feedwater System, Section 10.5.1, Design Bases, states that the system is required to supply automatically sufficient emergency feedwater to one or both steam generators to provide decay heat removal and maintain the reactor coolant system flow in the transition from forced to natural circulation when the reactor coolant pumps are tripped. FSAR Chapter 7.2.4, Emergency Feedwater Initiation and Control System, Section 7.2.4.1, Design Bases, lists initiation of emergency feedwater and OTSG level control of emergency feedwater as two of the design bases for the EFW system. The conclusion in the Operability Concerns Resolution that only the initiation is the design bases of EFW is not supported by the FSAR. In this instance, the information in the licensee's Enhanced Design Basis Document is in conflict with the FSAR.

Following the identification of the design problem, the licensee notified the other licensees that possesses this type of control system. A modification has been developed, which has been tested in the spare modules. This modification has been scheduled to be installed on the system prior to the unit starting up from the current design basis outage. The licensee verified that Procedures EOP-03, Natural Circulation Cooldown and EOP-09, Inadequate Subcooling Margin, contain instructions to ensure OTSG levels are increasing to the required setpoints. According to the procedures, if the system is not functioning as designed, the operators are to take manual control of the system and increase the water level to the required setpoint.

Appendix B, Criterion III of 10 CFR 50, requires that measures be established to assure that applicable regulatory requirements and the design basis for safety-related systems are correctly translated into specifications, drawings, procedures, and instructions. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, the licensee failed to assure that the design basis for the emergency feedwater initiation circuitry, which is part of a safety-related system, was correctly translated into specifications, in that a design deficiency existed that, under certain accident scenarios, would prevent the system from automatically filling the steam generator level to the natural circulation setpoint. This licensee identified and corrected violation is being treated as a Non-cited Violation consistent with Section VII.B.1 of the NRC Enforcement Policy and will be tracked as NCV 50-302/96-15-04, Failure to translate design requirements properly for the final design of the Emergency Feedwater Initiation and Control System.

c. Conclusions

A non-cited violation was identified for failure to translate design requirements properly for the final design of the EFIC system.

O5 Operator Training and Qualification

O5.1 Licensed Operator Requalification Program Inspection

a. Inspection Scope (71001)

The NRC conducted a routine, announced inspection of the licensed operator requalification program during the period October 21-25, 1996. The inspector reviewed and observed annual requalification examinations conducted by the licensee and inspected licensee training and re-qualification. Activities reviewed included examination development and administration, evaluator performance, remedial training, and inactive license activation. Violation 50-302/93-16-07 was reviewed as part of this inspection.

b. Observations and Findings

The inspector reviewed the sample plan developed for the examination which covered the last two year cycle. The overall sample plan construction was satisfactory. However, interviews with the persons developing the various parts of the examination revealed that they knew little of what knowledge and tasks were being sampled by the other exam developers. The instructors responsible for developing the written examinations and Job Performance Measures did not coordinate with the developer of the simulator portion of the examination to ensure that any one operator did not receive an overall exam that suffered from excessive topic or subject area overlap. The only defense to prevent this from occurring was the Supervisor of Nuclear Operations Training, who had the responsibility to review each overall individual examination prior to its administration. Examination validity is partly based upon adequately sampling the covered material. Excessive emphasis in one or more topic areas could jeopardize examination validity. The inspector found no excessive overlap for the test items that were reviewed.

The inspector reviewed one of three written examinations for content and level of difficulty. The inspector noted that the facility had eliminated the Part A Static Examination from their Requalification Program and now administered one, 45 question, open reference test to meet the requirements contained in 10 CFR 55.59. The inspector made several minor comments concerning question stem development, distractor improvement, and level of difficulty. The questions, in most instances, required an appropriate amount of analysis and synthesis of the given information to answer the question. The inspector concluded that the written examination to be satisfactory.

The inspector observed the operators' performance during simulator scenarios. In addition, the inspector observed evaluation critiques performed by licensee evaluators and one critique review conducted with the examinees. The inspector found the evaluators' performance in identifying and documenting both individual and crew performance deficiencies to be notably good. Individuals in need of remediation were quickly identified and remediation programs were promptly prepared.

The licensee's critique comments of the crews and individuals observed agreed with the inspector's observations. The two crews observed by the inspector performed satisfactorily. The inspector also noted that the licensee conducted effective debriefs with the operators on both a crew and an individual basis. The inspector considered the administration of the simulator portion of the annual operating test to be a strength of the requalification program.

The inspector also reviewed two remedial training programs resulting from weekly quiz failures and the reactivation of two inactive licenses. No deficiencies were noted in these areas.

c. Conclusions

The inspector concluded that the licensee's requalification program complied with the requirements of 10 CFR 55.59 for the areas inspected. The development and administration of the simulator portion of the operating test was considered a strength of the program. Violation 50-302/93-16-07 remains open, since completion of Request for Engineering Assistance REA-0406 is required prior to close out.

08 Miscellaneous Operations Issues

08.1 (Closed) URI 50-302/96-04-08, Evaluation of Evolutions Described as Unreviewed Safety Questions

a. Inspection Scope (92901, 40500)

As discussed in Inspection Report 50-302/96-04, this URI identified four additional tests, not described in the safety analysis report, for which safety evaluations were not documented as required by 10 CFR 50.59. Based on original inspection findings and the licensee's response, the NRC determined that these four tests constitute violations of 10 CFR 50.59. Violation B in Part I of the Notice for EA 95-126 identified two examples of a failure to comply with the requirements of 10 CFR 50.59.

b. Observations and Findings

Because of the circumstances of each of the four additional tests and the similarity of the tests and their root cause to those conducted on September 4 and 5, 1994, the NRC has determined to disposition these four unauthorized tests as examples three, four, five and six of Violation B in Part I of the Notice for EA 95-126.

c. Conclusions

Based on the above findings, URI 50-302/96-04-08, Evaluation of Evolutions Described as Unreviewed Safety Questions, is closed.

II. Maintenance

M3 Maintenance Procedures and Documentation

M3.2 Surveillance Observations

a. Inspection Scope (61726, 62707)

The inspector observed the performance of surveillance testing to observe that all prerequisites were being met, that the procedure was followed in the performance of the test, that the results were as expected and, if not, that adequate corrective actions were taken.

b. Observations and Findings

The inspectors witnessed the performance of two surveillance tests, SP-907B, Monthly Functional Test of 4160V Engineered Safeguards Bus "B" Undervoltage and Degraded Grid Relaying, and SP-354B, Monthly Functional Test of the Emergency Diesel Generator EGDG-1B. The inspectors attended the pre-job briefings for both surveillances and noted that strict adherence to the procedures were stressed and contingency actions were discussed in case any problems were encountered. The procedures were followed, in both cases, and no problems were encountered.

The inspector noted, however, that during the previous performance of SP-354B, a problem with an EDG jacket coolant temperature switch, DJ-8-TS, going into alarm at lower than expected temperatures had been observed. This was discussed in Inspection Report 96-13. At that time, a work request had been issued to investigate and repair the switch. The inspector verified that the Work Request had not been worked prior to subsequent performance of the surveillance, one month later. The inspector discussed this matter with the systems engineer responsible for the emergency diesel generators. The systems engineer was not aware that the Work Request had not been worked, as he had made that Work Request the number one priority on the EGDG.

The inspector was informed by the planning department that the licensee was planning to wait on the next system outage to repair the temperature switch. The inspector questioned this decision, as the repair of this temperature switch did not require the EGDG to be removed from operation. The planning department informed the inspector that there was no other reason that the switch was not scheduled to be repaired.

This switch does not trip the EGDG, but it provides an alarm, that could cause a great deal of concern and burden on the operators. The systems engineer was aware of this when he prioritized repairs to this switch. The work planning and scheduling department's decision to not schedule the work in accordance with the priorities assigned by the systems engineer is a weakness and could lead to problems if the alarm was received while the diesel was in actual emergency operation.

Following these discussions, the licensee worked the Work Request. The switch was found to be defective and would not calibrate properly. The switch was replaced and calibrated.

c. Conclusions

The work planning and scheduling department's decision to delay repairs to an EDG jacket coolant temperature switch, DJ-8-TS, is identified as a weakness. No problems were identified during the performance of the surveillance tests.

M8 Miscellaneous Maintenance Issues

M8.1 Remote Shutdown System

a. Inspection Scope (62707)

The inspector reviewed the licensee's maintenance and testing program for the Remote Shutdown System (RSS) at Crystal River to evaluate the adequacy of the licensee's program for surveillance testing of this system. Additionally the inspector reviewed post modification testing following implementation of design changes to this system to determine adequacy of testing.

b. Observation and Findings

The Crystal River RSS consists of the Remote Shutdown Panel (RSP), associated relay cabinets, and various local component controls and instrumentation. The inspector determined that the RSP was installed and functionally tested in 1985.

The inspector performed a walkdown on the RSP and associated relay cabinets. No loose wires, chattering relays, damaged components, or evidence of corrosion were observed during this walkdown. Material condition inside and outside of the panels, including housekeeping, was very good.

The inspector reviewed the licensee's listing of modifications issued by the licensee for the RSS and systems controlled from the RSP. Four modifications completed since 1985 which could have potentially affected operability of RSP instrumentation or the ability to control components from the RSP were selected for review. Modification Addition Records for those completed modifications were reviewed by the inspector to determine adequacy of post modification testing. The inspector determined that component controls were functionally tested from the Main Control Room, RSP or locally as necessary depending on the scope of modification activities. No problems were identified during this review.

The inspector reviewed Surveillance Procedures SP-338, Remote Shutdown and Post Accident Monitoring Channel Check, Rev. 25, and SP-161, Remote Shutdown Instrumentation Calibration, Rev. 12, which are used by the

licensee to satisfy Surveillance Requirement 3.3.18.1. The inspector also reviewed Performance Testing Procedure, PT-315, Remote Shutdown Relay Operability, Rev. 4, which is used by the licensee to periodically verify operability of all RSS relays. PT-315 is performed every refueling outage to verify that each RSS relay will energize and de-energize from its appropriate master transfer switch without failure due to mechanical binding or relay coil failure. The inspector noted that the licensee's program did not require any routine testing of handswitches or other functional controls located on the RSP.

During this review, the inspector noted that Procedure SP-338 did not provide for a channel check of the Motor Driven EFW Pump Discharge Pressure Gauge, EF-2-PI, as required by Surveillance Requirement 3.3.18.1. All other instrumentation listed in Surveillance Requirement 3.3.18.1 was adequately addressed by the licensee's surveillance testing program. This problem was discussed with licensee management and the inspector was informed that this TS required channel check was not being currently satisfied by any other licensee procedure. The inspector was further informed by the licensee that Problem Report (PR) 96-0413 had been issued to address this problem. Based on the licensee's preliminary review it appears that this required channel check may have previously been satisfied on a monthly basis by performance of the routine operability surveillance of the Motor Driven EFW pump. However, the periodic requirement for that pump operability surveillance was subsequently changed from monthly to quarterly without consideration of addressing Surveillance Requirement 3.3.18.1.

c. Conclusions

The inspector concluded that the licensee has maintained the alternate safe shutdown equipment in a satisfactory manner and that the licensee had adequately tested all affected equipment following implementation of modification activities for those Modification Approval Records reviewed. Based on the adequacy of this post modification testing, the inspector concluded that licensee modifications activities performed since original installation of the RSP should not have had a negative impact on any control functions of equipment operated from the RSP. Additionally the inspector determined that the licensee's routine testing program verifies operability of RSS relays such that relay failures will not result in the inability to operate equipment from the RSP required to support safe shutdown.

The inspector determined that the licensee surveillance testing program for the RSP was inadequate in that one TS required channel check was not covered by any existing licensee procedure. This failure will be documented as Violation 50-302/96-15-01, failure to perform a required TS surveillance for the remote shutdown panel.

M8.2 Balance of Plant (BOP) Equipment Reliability

a. Inspection Scope (62703)

The inspector reviewed licensee plant operating history to identify potential equipment reliability problems that might exist and to verify that maintenance activities for structures, systems, and components are being conducted in a manner that results in the reliable and safe operation of the plant. The purpose for this review was to identify equipment that has a history of recurring problems or whose failure resulted in a safety system actuation or plant shutdown or resulted in reduced system capability and determine if the problem might have been caused by inadequate maintenance.

b. Observation and Findings

The inspector reviewed the Crystal River Monthly Operating Data Reports and Weekly Thermal Performance Reports for 1995 and 1996. During this review the inspector noted that the licensee had experienced several power reductions resulting from degraded performance of Balance of Plant equipment. Two systems, the Condensate and the Circulating Water System, were selected for review which contained components that have caused a relatively large amount of power reductions. The inspector met with the system engineer assigned to those systems and reviewed the status of any licensee corrective actions to determine adequacy of those actions.

Condensate Pump Couplings

A large number of power reductions during 1995 and 1996 were associated with the condensate pump couplings. The inspector was informed that frequent changing of coupling brushes are required to prevent unplanned pump uncoupling. The pumps and motor shafts are coupled by an electromagnetic coupling device rather than mechanically connected. This design allows the speed of the pump to be varied while the motor turns at a constant speed. The speed of the pump is varied by controlling the magnetic field strength in the coupling device. Loss of the electrical field results in uncoupling of the pump and motor and has the same result on plant operation as a trip of the condensate pump motor.

The licensee experienced an unplanned power reduction from 100% to 62% on August 20, 1996, when CDP-1B became uncoupled. The inspector reviewed PR 96-0327 which addressed this failure. The failure appears to have been the result of excessive carbon buildup on the coupling slip rings, which resulted in the brushes shorting together. The inspector noted that the licensee had classified this failure as a Maintenance Preventable Functional Failure in accordance with the Maintenance Rule. Corrective actions associated with this failure are still being developed by the licensee.

The inspector noted that several other power reductions related to condensate pump couplings had occurred during this period. However, the inspector determined that these power reductions were planned to allow changing coupling brushes rather than waiting until a failure occurred. These replacements were generally performed based on the results of quarterly system walkdowns by the system engineer. The inspector noted that the licensee's practice of routine brush replacement was designed to prevent unplanned failures. However, this good engineering practice was based on the assigned system engineer's personal schedule for performing system walkdowns, which were more frequent than guidelines contained in the licensee's System Engineering Handbook. No routine Preventive Maintenance exists for brush replacement other than during refueling outages when the couplings are overhauled. Therefore component reliability was somewhat dependent on the experience level of the assigned engineer. The inspector discussed this lack of a structured program with licensee management. The inspector was informed that this weakness had already been recognized by the licensee and that enhancements were planned for the system engineering program, including development of additional program instructions on the routine duties of the system engineer. Additionally, the inspector was informed that review of Preventive Maintenance for these components was being considered as part of corrective actions associated with PR 96-0327.

Circulating Water System

The inspector determined that the Circulating Water System had experienced several different types of problems, which affected overall system reliability. These included condenser tube failure, Circulating Water Pump discharge difuser head leaks, and improper cycling of circulating water debris filter flaps.

One condenser tube failure has occurred since the licensee completed retubing the main condenser with Titanium tubes in 1994. The licensee determined that tube failure was the result of a local vibration problem experienced by a small portion of tubes located in the inner section of the condenser. The affected tubes were not staked, and the lack of support made them more vulnerable to failure than other tubes. The licensee identified all affected tubes and plugged approximately 165 inner section tubes to prevent recurrence of this problem. The inspector noted that this number represented less than 2% of the total number of tubes.

Two power reductions during this period due to Circulating Water Pump discharge leakage were noted by the inspector. The inspector concluded this problem was the result of system design. The leakage occurred at locations vulnerable to flow induced erosion caused by lifting holes located in the circulating water flowpath in pump difuser heads. The licensee is repairing these leaks and eliminating the lifting holes in an effort to prevent recurrence.

Two power reductions occurred during a recent three month period associated with circulating water debris filter flap motor drive

problems. Each circulating water waterbox is equipped with a series of motor driven debris filter flaps which allow swapping of the online debris filters to the standby filters. Improper flap positioning can result in degraded circulating water system performance, and a power reduction must occur to correct the problem. The inspector reviewed PR 95-0079 and 96-0248, which were issued by the licensee to address these problems. Additionally, the inspector reviewed Failure Analysis Report, FA 96 CWFL-01, which documented the licensee's root cause determination for this problem. The inspector noted that prior to 1995 no preventative maintenance had been performed on these components (run to failure). As the result of the licensee's review in this area, changes to the licensee's Preventative Maintenance program occurred, including a requirement for periodic lubrication and inspections of the limitorque operator. However, the inspector noted that the licensee determined that the actual root cause was a lack of understanding by maintenance personnel of the internal working mechanisms and that actions taken during maintenance activities were not clearly understood. As the result of this a significant number of malfunctions (filter flap overtravel and subsequent mechanical binding) have occurred due to improper limit switch and mechanical stop nut adjustments since refurbishment of debris filter equipment occurred in 1993 and 1994. Corrective actions included additional training for maintenance personnel. Additionally, all filter debris motor operators and associated gearboxes are scheduled to be rebuilt and correctly setup. These repairs are planned to be performed in conjunction with scheduled Circulating Water Pump discharge header repairs. The licensee plans to perform this work under the direction of a vendor representative.

c. Conclusions

The licensee has experienced several unplanned power reductions due to poor reliability of Balance of Plant equipment. Although some of these problems have resulted from equipment design, other problems were made worse by prior maintenance practices. These problems are well understood by licensee management, and ongoing corrective actions are being taken in an attempt to increase reliability of the associated equipment.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Post-Accident Recriticality Concerns

a. Inspection Scope (37551)

On June 13, 1995 the B&W Owners Group notified the NRC of Preliminary Safety Concern 1-95, which informed the agency that, under 10 CFR 50.46 Appendix K, assumptions for a post-accident condition, a core criticality issue is possible. The purpose of this inspection was to identify and track the licensee's response to this concern.

b. Observations and Findings

On October 25, 1996, PR 96-437 was issued addressing a letter received from Framatome Technologies, Inc. regarding proposed changes to the B&W Owners Group EOP Technical Bases Document. The portion of the document inspected addresses a concern with the potential for recriticality, due to localized boron dilution, following reactor coolant pump restart. The conditions which could result in localized boron dilution could develop whenever adequate core exit subcooling margin had been lost and during High Pressure Injection cooling.

The licensee, through the B&W Owners Group, has been working with NRR to resolve this concern. An Inspector Follow-Up Item, IFI 50-302/96-15-03, Actions Taken to Resolve Recriticality Concerns, was opened to track the plant specific corrective actions for post-accident recriticality concerns.

c. Conclusions

One IFI was identified to track the licensee's specific corrective actions to resolve the concern with the potential recriticality in certain accident scenarios.

IV. Plant Support

R6 Radiological Protection and Chemistry Organization and Administration

R6.1 Mr. W. Lagger was named as Manager, Radiation Protection on a temporary basis as a result of the promotion of Mr. D. Wilder.

P1 Conduct of Emergency Preparedness Activities

P1.1 Emergency Drill (82301)

An Emergency Drill was held on October 16 with Region II participation. The results will be discussed in Inspection Report 50-302/96-14.

F1 Control of Fire Protection Activities

F1.1 Resolution of Thermo-Lag Fire Barrier Issue

a. Inspection Scope (64704, 71750)

The inspector reviewed the action taken by FPC to resolve the degraded Thermo-Lag fire barrier issue at Crystal River 3 and to determine if this action was consistent with the NRC requirements.

b. Observations and Findings

In 1991, the NRC found that Thermo-Lag fire barrier material did not always perform to the manufacturer's specifications. Specifically, the installed Thermo-Lag barriers would actually provide approximately one

half of the specified rating, i.e., a 1-hour fire rated barrier would provide approximately 20 to 30 minutes of protection. The NRC issued NRC Bulletin 92-01 and requested licensees with Thermo-Lag fire barriers to take the appropriate compensatory measures for the areas where the Thermo-Lag materials were installed. FPC responded to this bulletin by letters dated July 29, 1992, and October 2, 1995.

Subsequently, FPC sent a number of letters to the NRC to address this issue. Initially, approximately 2,400 linear feet of electrical raceways at Crystal River Unit 3 were covered by the Thermo-Lag fire barrier material. FPC performed an analysis which eliminated the need for Thermo-Lag fire barriers by either rerouting cables, installing a different type fire barrier material (Mecatiss), or requesting an exemption from NRC for certain plant areas. The NRC has not issued a Safety Evaluation Report to address these items.

During this inspection, the inspector reviewed the following actions taken by FPC to resolve the Thermo-Lag issue:

Containment:

On February 15, 1996, FPC submitted a letter to the NRC which provided a justification for not meeting the Appendix R requirements for this area. An exemption request was submitted for the continued use of Thermo-Lag as radiant energy heat shields in the Reactor Building for protection of nuclear instrumentation circuits. Since the submittal of this letter, FPC elected to address the combustibility of the Thermo-Lag material in the Reactor Building by either removing the Thermo-Lag fire barriers from the electrical raceways or covering the Thermo-Lag with stainless steel sheets 0.01 inches thick.

The Thermo-Lag removed from electrical raceways in the Reactor Building provided protection for source range instrumentation circuits. This issue was previously reviewed by the NRC, documented by NRC Inspection Report No. 50-302/96-06; FPC's evaluation for the removal of these thermal radiant energy heat shields had been found to be inadequate. This issue was documented as Unresolved Item 50-302/96-06-10 and remains open pending further NRC review.

The inspector reviewed the work requests which covered or removed the Thermo-Lag fire barrier material. A walkdown inspection of the Reactor Building was made and the inspector verified that all Thermo-Lag had either been removed or covered with the stainless steel sheets.

Auxiliary and Intermediate Buildings (Mecatiss):

A total of approximately 320 linear feet of electrical raceways in the Auxiliary and Intermediate Buildings were to be enclosed with a Mecatiss fire barrier. At the conclusion of this inspection, this work was approximately 90 percent complete. Several Mecatiss fire barrier designs were used. The one hour and three hour Mecatiss designs consisted of multiple layers (additional layers for three hour rating)

of a mineral wool composite material, inner and outer washable cloth wrap and a refractory glue. Portions of the existing Thermo-Lag raceway fire barriers were being upgraded by protecting the Thermo-Lag with Mecatiss. A mineral wool composite material (single layer for one hour and multiple layers for three hours), inner and outer washable cloth wrap and a refractory glue was installed over the existing Thermo-Lag fire barrier materials.

The inspector reviewed procurement documents, receipt inspection and storage records, certificate of conformity for purchased materials, manufacturer's installation employee certification records, work in process and inspected completed Mecatiss installations.

The inspector noted that the Mecatiss installation was of high quality. FPC was providing continuous coverage of the installation by a construction Quality Control inspector and a representative from the site fire protection group. This was to assure that the installation met the design and construction requirements.

c. Conclusions

The licensee's actions in the resolution of the Thermo-Lag issue were considered positive. The installation of the Mecatiss fire barriers was of high quality, and continuous FPC oversight of the installation process provided assurance that the installation met the design and construction requirements.

F1.2 Oil Collection Systems for the Reactor Coolant Pumps

a. Inspection Scope (64704)

The oil collection system for the reactor coolant pumps was reviewed for compliance with the requirements of 10 CFR 50 Appendix R Section III.O.

b. Observations and Findings

The inspector performed a tour of the Reactor Building while the unit was shut down to evaluate the performance of the reactor coolant pump oil collection systems for the previous operational period from May 16 to September 2, 1996. The Unit completed a refueling outage on May 16, and had been shutdown on September 2 for turbine related maintenance. The unit remains shut down to resolve several design basis issues.

During this inspection of the Reactor Building, the inspector noted significant accumulation of oil directly beneath the "D" reactor coolant pump. The licensee had previously identified this problem and issued a work order to identify the source of the leak and make the necessary repairs. Following this inspection, the licensee's evaluation found that the oil was leaking from the "D" reactor coolant pump's lubrication system. The associated oil collection system was catching but was not retaining the leaking oil, and this leaking oil was not being drained into the tanks designed for this purpose. The licensee estimated that

approximately four gallons of oil had leaked from the pump's lubrication system. Most of this oil had not been collected by the pump's oil collection system. This oil leaked from the oil collection system due to an inadequately tightened gasket seal on one of the connection plates at the bottom level of the oil collection system.

The failure to restore the oil collection system to service following the 1996 refueling outage resulted in the oil collection system not being able to perform its design function. 10 CFR 50 Appendix R, Section III.O requires an oil collection system for reactor coolant pumps. The failure to provide an operable oil collection system is identified as Violation 50-302/96-15-02, Failure of Reactor Coolant Pump Oil Collection System To Retain Oil Leaking From Reactor Coolant Pump Motor.

Several problems have been identified with the reactor coolant pump oil collection systems at Crystal River Unit 3. These include:

- January 1988 (Licensee Event Report (LER) 88-09): Liquid from a cooling water leak flowed into the oil collection system tank and resulted in the tank having insufficient volume to collect the oil from the lubrication system for the reactor coolant pump motors.

- October 1990 (No LER issued): Oil leaked from the oil collection system to the floor of the Reactor Building due to a missing sheet metal plate on the lower portion of the oil collection system.

- October 4, 1992 (LER 92-21): Oil/water mixture in the oil collection system tanks from leaking oil, service water and condensation exceeded the capacity required to be maintained in the tanks to collect the oil from the pumps lubrication systems.

- May 19, 1995 (LER 95-08): Oil leaking from the coolant pumps lubrication system was not being collected by the oil collection system due to leaks from thermocouple conduits and seams in the oil collection system enclosure.

Non-cited Violation 50-302/96-04-05, Failure to Collect Reactor Coolant Pump Motor Oil Leakage, was issued for the May 19, 1996 event.

c. Conclusions

The oil collection system for reactor coolant pump motor "D" was not catching and collecting oil leaking from the motor's lubrication system as required. This failure is identified as Violation 50-302/96-15-02.

F8 Miscellaneous Fire Protection Issues

F8.1 (Closed) IFI 50-302/96-06-09, Several Deficiencies in Procedures and Documentation for the Mecatiss Fire Barrier Program

a. Inspection Scope (64704)

As stated in Inspection Report 96-09, the NRC had concerns related to the use of missing attachment studs for cable trays, lack of test data on some raceway configurations, no evaluations for use of Mecatiss on junction boxes, and the shelf life of the glue used for the installation of Mecatiss. The inspector reviewed the licensee's actions in these areas.

b. Observations and Findings

The inspector verified that the licensee had resolved the NRC concerns in a satisfactory manner.

c. Conclusions

IFI 50-302/96-06-09, Several Deficiencies in Procedures and Documentation for the Mecatiss Fire Barrier Program, is closed.

F8.2 (Open) URI 50-302/96-06-10, Justification for the Removal of Thermo-Lag Protection from the Source Range Instrumentation (64704)

This item remains open pending further review and resolution by the NRC (NRR).

V. Management Meetings

X1 Exit Meeting Summary

The inspection scope and findings were summarized on November 4, 1996. The inspectors described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

X3 Management Meeting Summary

X3.1 On October 31, 1996, a management meeting was held on site at FPC to review the licensee's Corrective Action Plan to improve Engineering performance. A meeting summary will be issued separately.

PARTIAL LIST OF PERSONS CONTACTED

Licensees

K. Baker, Manager, Nuclear Configuration Management
L. Barbieri, System Engineer
W. Barlow, System Engineer
P. Beard, Senior Vice President, Nuclear Operations
G. Boldt, Vice President, Nuclear Production
J. Campbell, Assistant Plant Director, Maintenance and Radiation Protection
W. Conklin, Jr., Director, Nuclear Operations Materials and Controls
R. Davis, Assistant Plant Director, Operations and Chemistry
D. DeMontfort, Manager, Nuclear Operations
M. Donovan, Supervisor, Rapid Engineering Response Team
M. Fitzgerald, Supervisor, System Engineering
R. Fuller, Manager, Nuclear Chemistry
B. Gutherman, Manager, Nuclear Licensing
P. Haines, System Engineer
G. Halnon, Assistant Director, Nuclear Operations Site Support
B. Hickle, Director, Nuclear Plant Operations
L. Kelley, Director, Nuclear Operations Site Support
H. Koon, Manager, Nuclear Production and Nuclear Outage
K. Lancaster, Manager, Nuclear Projects
J. Maseda, Manager, Engineering Programs
P. McKee, Manager, Nuclear Plant Operations Support
R. McLaughlin, Nuclear Regulatory Specialist
W. Rossfeld, Manager, Site Nuclear Services
J. Stephenson, Manager, Radiological Emergency Planning
F. Sullivan, Manager, Nuclear Engineering Design
J. Terry, Manager, Nuclear Plant Technical Support
D. Watson, Manager, Nuclear Security
R. Widell, Director, Nuclear Operations Training
D. Wilder, Manager, Safety Assessment Team

NRC

W. Bearden, Reactor Inspector, Region II (October 7 through 11, 1996)
S. Cahill, Resident Inspector, Watts Barr (October 21 through 24, October 28 through 29, October 31, 1996)
C. Casto, Engineering Branch Chief, Region II (October 31, 1996)
K. Clark, Public Affairs Officer, Region II (October 31, 1996)
B. Crowley, Reactor Inspector, Region II (October 7 through 9, 1996)
S. Ebneter, Regional Administrator, Region II (October 31, 1996)
A. Gibson, Director, Division of Reactor Safety, Region II (October 31, 1996)
F. Hebdon, Director, Directorate II-3, NRR (October 9, October 31, 1996)
G. Hopper, Reactor Engineer, Region II (October 21 through 25, 1996)
J. Hufham, Incident Response Coordinator, Region II (October 11, 1996)
J. Jaudon, Deputy Director, Division of Reactor Safety, Region II (October 28 through 29, October 31, 1996,)
J. Johnson, Deputy Director, Division of Reactor Projects, Region II (October 31, 1996)

K. Landis, Branch Chief, Region II (October 17, 1996, October 31, 1996)
W. Miller, Reactor Inspector, Region II (October 9 through 11, 1996)
L. Raghavan, Project Manager, NRR (October 9, October 31, 1996)
R. Schin, Reactor Inspector, Region II (October 7 through 11, 1996)
D. Thompson, Physical Security Specialist, Region II (October 29 through 30, 1996)

INSPECTION PROCEDURES USED

IP 37550:	Engineering
IP 37551:	Onsite Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 64704:	Fire Protection Program
IP 71001:	Licensed Operator Requalification Program Evaluation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 82301:	Evaluation of Exercises for Power Reactors
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92901:	Followup - Operations
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

Type	Item Number	Status	Description and Reference
VIO	50-302/96-15-01	Open	Failure to perform a required TS surveillance for the remote shutdown panel. (paragraph M8.1)
VIO	50-302/96-15-02	Open	Failure of reactor coolant pump oil collection system to retain oil leaking from reactor coolant pump motor. (paragraph F1.2)
IFI	50-302/96-15-03	Open	Actions taken to resolve recriticality concerns. (paragraph E2.1)

Closed

Type	Item Number	Status	Description and Reference
NCV	50-302/96-15-04	Closed	Failure to properly translate design requirements for the final design of the EFIC system. (paragraph O2.2)

URI	50-302/96-04-08	Closed	Evaluation of evolutions described as Unreviewed Safety Questions. (paragraph O8.1)
IFI	50-302/96-06-09	Closed	Several deficiencies in procedures and documentation for the Mecatiss fire barrier program. (paragraph F8.1)

Discussed

Type	Item Number	Status	Description and Reference
URI	50-302/96-06-10	Open	Justification for removal of Thermo-Lag protection from the source range instrumentation. (paragraph F1.1, F8.2)
NCV	50-302/96-04-05	Closed	Failure to Collect Reactor Coolant Pump Motor Oil Leakage. (paragraph F1.2)
VIO	50-302/89-19-02	Closed	Failure to verify the closed position of manual valves associated with EFW containment penetrations as required by RS 4.6.1.1.a.1. (paragraph M3.1)
LER	50-302/96-018	Open	Inadequate containment penetration surveillance procedure results in TS violation. (paragraph M3.1)
LER	50-302/88-003	Closed	Personnel error during development and review of surveillance procedures leads to inadequate surveillance frequency for four containment isolation valves. (paragraph M3.1)
LER	50-302/89-028	Closed	Personnel errors during development of revision to surveillance procedure result in containment integrity valves not being properly surveilled. (paragraph M3.1)
LER	50-302/94-007	Closed	Personnel error leads to failure to perform surveillance resulting in violation of TS. (paragraph M3.1)
LER	50-302/88-009	Closed	Violation of Appendix R III.0 due to insufficient reserve volume in Reactor Coolant Pump lube oil

			collection system. (paragraph F1.2)
LER	50-302/92-021	Closed	Lack of required lube oil leakage collection tank reserve capacity for reactor coolant pumps. (paragraph F1.2)
LER	50-302/95-008	Closed	Oil leakage from reactor coolant pump motors not collected by lube oil collection system leads to operation outside design basis. (paragraph F1.2)
VIO	50-302/93-16-07	Open	Inadequate EOP and AP procedures. (paragraph O5.1)

LIST OF ACRONYMS USED

B&W - Babcock & Wilcox
CFR - Code of Federal Regulations
EA - Enforcement Action
EFIC - Emergency Feedwater Initiation and Control
EFW - Emergency Feedwater
EGDG - Emergency Diesel Generators
EOP - Emergency Operating Procedure
FPC - Florida Power Corporation
FSAR - Final Safety Analysis Report
IFI - Inspection Followup Item
LER - Licensee Event Report
NCV - Non-cited Violation
NOV - Notice of Violation
NRC - Nuclear Regulatory Commission
NRR - Office of Nuclear Reactor Regulation
NUREG - NRC technical report designation
OTSG - Once Through Steam Generator
PR - Problem Report
RSP - Remote Shutdown Panel
RSS - Remote Shutdown System
SP - Surveillance Procedure
TS - Technical Specification
URI - Unresolved Item
VIO - Violation