U. S. NUCLEAR REGULATORY COMMISSION

REGION II

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Licensee:	Florida Power and Light Company
Facility:	Turkey Point Units 3 and 4
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Inspectors:	T. P. Johnson, Senior Resident Inspector J. R. Reyes, Resident Inspector W. H. Miller, DRS Inspector (Sections F2.1 and F8.1-8.3)
Approved by:	K. D. Landis, Chief Reactor Projects Branch 3 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY
TURKEY POINT UNITS 3 and 4
Nuclear Regulatory Commission Inspection Report 50-250, 251/97-11

This integrated inspection to assure public health and safety included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six week period September 21 to November 1, 1997, of resident inspection. In addition, the report includes a regional announced inspection of fire protection activities.

Operations

- Observed Unit 4 core reload activities were noteworthy, with formal communications, effective teamwork, and strong procedure compliance (Section O1.1).
- The Unit 4 restart from the refueling was professionally conducted, with strong oversight and excellent communications. Reactivity management controls were effective (Section O1.2).
- Power system stabilizer testing was well planned and executed. Risk management controls and oversight were evident (Section O1.3).
- Operator testing on the standby steam generator feedwater system was well performed. System functionality and material condition were good (Section O2.1).
- The Unit 3 and Unit 4 auxiliary feedwater systems, high head safety injection systems, cold leg accumulators, and containment systems were appropriately aligned (Sections O2.2, O2.3, and O2.4).
- Management's self-assessment process for the Unit 4 restart from refueling was noteworthy (Section O7.1).
- Safety committee meetings met regulatory requirements. Members displayed an excellent focus towards nuclear safety (Section O7.2).

Maintenance

- Standby steam generator feedwater pump operability surveillance testing was being performed using plant installed gages that were not in a periodic calibration program. The gages were within calibration criteria; however, this issue is unresolved (Section O2.1).
- The 4B reactor coolant pump repair activities were well planned and implemented. Supervision and oversight of the job performance were strong (Section M1.2).

- Unit 4 engineered integrated safeguards testing was well planned and conducted, with excellent senior reactor operator oversight and strong procedure compliance (Section M1.3).

- Diesel driven fire pump maintenance work was appropriately conducted (Section M1.4).

- Modifications to the residual heat removal motor operated injection valves were well planned and executed by mechanical maintenance (Section M2.1).

- Unit 4 containment closeout inspections noted minor issues that were corrected prior to Mode 4 entry (Sections M2.2 and M2.3).

- Electrical maintenance was proactive and took conservative safety measures in implementing a temporary system alteration to obtain off-site backup security power to perform the cable tray maintenance (Section S2.1).

Engineering

- Systems engineering took prompt and appropriate corrective actions in identifying and correcting a Unit 4 cold leg accumulator nitrogen leak (Section O2.4).

- Engineering support for operations and maintenance was very good during the period, with multiple examples noted (Sections O1.1, O1.3, O7.1, M1.2, M1.3, and M2.1).

- Engineering was prompt in performing the evaluation and implementing corrective actions on the required clamping for the equalizing line on motor operated valve MOV-4-751. However, the root cause for the missing clamp was unknown (Section M2.2).

- Unit 4 initial criticality and low power physics testing exhibited very good coordination between operations and reactor engineering, and overall performance was noteworthy (Section E1.1).

- Event response team activities relative to two Unit 4 restart problems (rod control urgent failure alarms due to card failures during pre-startup testing and turbine-generator lockout due to a loose fuse and potential transformer connection) were thorough, demonstrated very good root cause assessment, and the implemented corrective actions were appropriate (Section E2.1).

Plant Support

- Radiation protection and dose related activities for a reactor coolant pump repair were very good. Dose savings measures were aggressive (Section M1.2).

- A hot spot that was not posted in the Unit 4 charging pump room was a non-cited violation (Section R1.1).

- Security response during the CAT 400 diesel generator failures was appropriate (Section S2.1).

- Operator and fire team responses to smoke in the boric acid storage room were timely and professional, and overall licensee actions were very good (Section F1.1).

- Engineering design projects and construction activities were in process to eliminate the Thermo-Lag fire barrier issue at Turkey Point by December 2001. The Thermo-Lag materials had received appropriate receipt inspections and testing and were properly stored prior to installation. The fire hazards associated with the Thermo-Lag fire barrier materials installed inside each unit's containment had been satisfactorily eliminated by covering the material with stainless steel metal sheets. The workmanship of the completed 3-hour Thermo-Lag installations was of high quality. Engineering support for the design and installation of the modification work activities was outstanding. Appropriate quality control surveillance and independent verification of the work activities were being provided and appropriate records were being maintained (Section F2.1).

- The failure to provide an oil collection system capable of catching and retaining all potential points of oil leakage from each reactor coolant pump motor oil lubrication system was identified as a non-cited violation. This issue was identified by the licensee and appropriate action was initiated to correct this problem during each unit's next refueling outage (Section F8.1).

- The licensee's evaluation of "hot short" conditions in the event of an Appendix R control room fire was comprehensive and included all of the motor operated valves controlled from the control room and required for an Appendix R safe shutdown. However, the evaluation considered only a single spurious valve action where as the current NRC staff interpretation of Information Notice 92-18 suggest that evaluations for multiple spurious actions should be performed. The industry has objected to this position and NRC is currently reevaluating this issue. The licensee has deferred further review of this issue for Turkey Point pending NRC's resolution of this issue (Section F8.2).

- The licensee's evaluations of fire barrier penetration seals concluded that there were no operability concerns associated with the installed penetration seals; however, a significant number of fire barrier penetration seals either were not bounded by a tested configuration or justified by an existing fire protection evaluation. A project had been initiated to evaluate each installed fire barrier penetration seal. Penetration seals not bounded by a tested configuration or addressed by an existing

engineering justification were to be justified by an evaluation or appropriately upgraded by a plant modification. .This issue is an inspection follow-up item (Section F8.3).

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REPORT DETAILS

Summary of Plant Status

Unit 3

At the beginning of this reporting period, Unit 3 was operating at or near full reactor power and had been on line since August 14, 1997. The unit operated at full power during the period.

Unit 4

At the beginning of this reporting period, Unit 4 was shutdown for the cycle 17 refueling outage. The unit restarted on October 12, 1997, and achieved full power on October 18, 1997. The unit operated at full power during the remainder of the period.

I. Operations

O1 Conduct of Operations

O1.1 Unit 4 Core Reload

a. Inspection Scope (71707 and 60710)

The inspectors reviewed core reload and related core alteration activities during recovery from the Unit 4 Cycle 17 outage.

b. Observation and Findings

During the period September 27-29, 1997, the licensee reloaded the Unit 4 reactor core for Cycle 17. This was performed in accordance with the Unit 4 Cycle 17 core reload procedures.

The inspectors reviewed the applicable procedures, refueling Technical Specifications (TSs), operating procedures for each refueling station, the Updated Final Safety Analysis Report (UFSAR) Section 9.5, and operation and reactor engineering logs. The inspectors witnessed portions of the Unit 4 reload activities from the following locations:

- Reactor Control Operator (RCO) station in the control room;
- Reactor engineer station in the control room;
- RCO and Senior Reactor Operator (SRO) stations on the manipulator bridge;
- Containment upender and transfer cart station;
- Spent Fuel Pool (SFP) upender and transfer cart station, and

- RCO and SRO station on the SFP bridge.

The inspectors independently verified that both the Mode 6 TSs and the procedure requirements were met. Reactor engineering support and oversight was noted to be excellent.

c. Conclusions

For those evolutions that were directly observed, the inspectors noted that communications were formal, teamwork was effective, and procedure usage and compliance was strong. Overall, observed Unit 4 core reload activities were noteworthy, including reactor engineering support.

01.2 Unit 4 Mode Changes and Startup (61703, 71707 and 71711)

Unit 4 transitioned from Mode 6 to Mode 1 during the period September 27 to October 13, 1997. The unit achieved criticality at 5:08 p.m. on October 12, 1997, and was placed on-line October 13, 1997. This ended the Unit 4 Cycle 17 refueling outage. The outage was originally scheduled for 28 days and was completed in 35 days. Following completion of the turbine overspeed test, the unit was placed back on-line on October 14, 1997. Full power was achieved on October 18, 1997.

The inspectors noted that the Unit 4 outage delays were caused by control rod troubleshooting, 4B RCP work, upper internals repair, and several valve repairs. Some of the selected issues are discussed further in the following report sections. Notwithstanding these delays, the licensee demonstrated conservatism, aggressiveness, and very good performance in dealing with these issues.

The inspectors observed portions of the mode changes and startup activities, power ascension, turbine overspeed testing, Main Steam Isolation Valve (MSIV) and Safety Valve (MSSV) testing, Auxiliary Feedwater (AFW) testing, and other related activities. The inspectors noted strong oversight and excellent communications, and concluded that the Unit 4 startup from the outage was professionally conducted. Reactivity management controls used by operations were effective.

01.3 Power System Stabilizer (PSS) Test (71707)

During the period October 28-30, 1997, the licensee conducted Temporary Procedure (TP) 97-038, Main Generator Voltage Regulator Power System Stabilizer (PSS) Commissioning Test. The PSS is supplementary to the voltage regulator control and is designed to dampen potential generator rotor swings. A number of the FPL units have installed and tested PSSs. When the electrical generators are tied to and synchronized to the grid, faults, line trips, unit trips, and other disturbances can possibly cause rotor phase angle swings. This can result in output swings in both real and reactive load. Turkey Point units have seen this phenomena in the past primarily during the winter generating months when the FPL grid is providing power to the north.

The licensee considered this TP to be a risk related activity. Controls used included "red sheet" approval by the plant manager; procedure O-ADM-217, Conduct of Infrequent Tests and Evolutions; PNSC approval of TP; site Vice President review and approval; and, operations crew briefings and simulator training.

The inspectors reviewed the TP, observed implementation, discussed the PSS and testing with engineering, and reviewed risk controls and management oversight. The inspectors concluded that engineering support and planning, operations performance, risk controls, and overall procedure implementation were very good.

02 Operational Status of Facilities and Equipment

02.1 Standby Steam Generator Feed Water (SSGF) System

a. Inspection Scope (71707 and 61726)

The inspectors performed a SSGF system walk down, reviewed the system with the assigned system engineer, observed portions of the monthly diesel pump surveillance, and reviewed the calibration history on the gages used for the surveillance testing.

b. Observations and Findings

The following procedures, prints, and documents were reviewed:

0-OSP-074.3	Standby Steam Generator Feed Water Pumps Availability Test
0-OP-074.1	Standby Steam Generator Feed Water System
5610-M-3074	Standby Steam Generator Feed Water Pumps P&ID
TS 3.7.1.6, 4.7.1.6	Standby Feed Water System
UFSAR	Standby Feed Water Pumps

The SSGF system is a shared system and consists of two pumps in parallel, each taking suction through a common header from the Demineralized Water Storage Tank (DWST). The "A" pump is driven by an electric motor and the "B" pump is driven by a diesel engine. The two pumps discharge to a common header. Through operator valve manipulation, flow is then directed to either the Unit 3 or Unit 4 steam generators. As described in the Updated Final Safety Analysis Report (UFSAR), the SSGF is a non-safety grade system. However, technical specifications require a monthly operability surveillance by testing the pumps in a recirculation mode, and an 18-month operability surveillance by starting the pumps and providing feed water to the steam generators. In addition, technical specification requires the licensee to determine, at least once per 24 hours, that the volume in the DWST is within required limits.

The inspectors independently reviewed and verified the valve lineup requirements for the SSGF system, as described in the licensee valve line-up procedures and the P&ID. In addition, the inspectors walked down the SSGF system with the responsible system engineer. The system engineer had been recently assigned to this system. The system engineer was undergoing his qualifications for the SSGF, but had already completed the oral board for the main feed water system. The previous system engineer was still on site and could provide backup technical support if required.

Three Plant Work Orders (PWO) were outstanding on this system. One was for hinges to be replaced on the doors which provided access to the diesel controls and gages. The inspectors noted that this PWO was worked and completed during the inspection period. The second PWO was for verification of annunciator J9, which annunciated if there was a failure with the diesel gear oil pressure. Upon further review of this PWO, the licensee later informed the inspectors that this PWO had already been worked and was completed, but the PWO tag had not been removed. The third PWO had been written for some frayed hoses going to the oil cooler heat exchanger. Overall, the SSGF system was well maintained.

The inspectors observed portions of the monthly surveillance on the "B" diesel-driven pump, and noted that the surveillance test was well performed. The Senior Nuclear Plant Operator (SNPO) performing the test was well versed with the procedure and with the system. Also, the inspectors noted good procedure adherence and good communications with the control room.

The inspectors found that the required monthly surveillance test on the diesel pump was being performed weekly. Upon further questioning the licensee for the basis of the increased surveillance frequency, engineering was called to provide the basis. Engineering explained that there had been some issues with the monthly surveillance on the diesel engine. Namely, the diesel would have a slow start when tested monthly. On at least one occasion the oil pressure trip actuated due to the slow start. The fuel pump is mounted above the fuel tank and during periods of long standby, the fuel system could partially drain and cause a longer starting time until the fuel pressure builds up. However, engineering specified that the longer starting time was not an operability concern. Seven potential solutions had been reviewed. The licensee had decided to increase the frequency of the surveillance testing and thereby decrease the amount of time that the diesel was in standby mode. This technical issue and the frequency increase information had not been formally captured in any of the licensee's documentation. Engineering documented this assessment and indicated this information would be added to the procedure basis document and tracked via Condition Report 97-1901.

The licensee concluded the surveillance test was satisfactory and the "B" SSGF pump was returned to service. The inspectors reviewed the acceptance criteria of the surveillance test. The surveillance

procedure required a pressure drop measurement and a recirculation flow measurement to be plotted. The test was satisfactory if the data point fell within a window as specified in the procedure. During the surveillance observation, the inspectors had noted that the process parameter measurements were taken from installed gages. The inspectors reviewed the calibration requirements on the gages used for the surveillance testing and subsequently found that only the pressure discharge gages were in a periodic calibration Preventive Maintenance (PM) program. Since this was a technical specification surveillance to determine pump operability, the Turkey Point Quality Instruction QI 12-PTN-3, Calibration of Installed Plant Instrumentation, required that the gages be calibrated. The inspectors communicated this finding to the licensee. The following table describes the calibration status of the gages used at the time of the surveillance.

Gage	ID	PM Program	Last Calibration
Pump Suction	PI-6697A	NO	8/17/96
	PI-6697B	NO	11/18/96
Pump Discharge	PI-6511A	YES	6/10/97
	PI-6511B	YES	6/10/97
Recirculation Flow	FI-6657A	NO	8/3/88
	FI-6657B	NO	5/23/95
DWST Level	LI-6210	NO	2/27/97

Upon investigation of the calibration data, the licensee included these additional issues in a condition report, performed a calibration check on the gages that had not been recently calibrated, and made an operability assessment of the SSGF system. All the process parameter gages were found to be within the required accuracy specifications. Further, engineering's interim disposition concluded that the SSGF pumps were operable. In addition, the inspectors reviewed the operability assessment and concluded that there was no operability concern. This issue was also being tracked via Condition Report 97-1638.

To determine if there were any other gages that fell within the scope of the Quality Assurance (QA) program but were not being included in the PM calibration program, the licensee formed a team and embarked on a program to identify and verify that required gages were being included in the calibration program. The team consisted of personnel from engineering, licensing, work control, document control, and operations. The inspectors noted that a comprehensive plan and a very aggressive

schedule was presented to the plant manager. This issue is an Unresolved Item (URI) 50-250,251/97-11-01, pending further licensee review, and NRC review of licensee root cause analysis and corrective actions.

c. Conclusions

Operator testing was well performed. System functionality and material condition was good. However, one unresolved item was opened: Operations was performing pump operability surveillance on the SSGF pumps and measuring DWST level using plant installed gages that were not in a periodic calibration PM program. The gages were within calibration criteria. The licensee embarked on a comprehensive program to identify any other gages that should be included in the periodic calibration PM program.

02.2 Containment Lineup Verifications (61715 and 71707)

The inspectors verified the appropriate Unit 3 and Unit 4 containment lineups, including containment integrity verifications, containment isolation valve operability checks, temperature and pressure limit verifications, and operator awareness of these issues. TS operability and surveillance requirements were spot checked, and no abnormalities were noted.

The inspectors concluded that the Unit 3 and 4 containments met integrity requirements, and the containment systems were appropriately aligned.

02.3 Auxiliary Feedwater (AFW) System Walkdown (71707)

During the period, the inspectors walked down portions of the Unit 3 and Unit 4 AFW systems. This was accomplished during power operations for Unit 3 and during prestartup activities from the Cycle 17 refueling for Unit 4. The inspectors used Piping and Instrument Drawings (P&IDs), OP lineup sheets, and surveillance test information.

Instrument Air (IA) valve 4-40-297 was noted not to be fully opened. The valve is a 1/2 inch 90° ball valve, and the valve handle was slightly off its "in line" position. The valve provides Unit 4 IA to the Unit 3 train 1 AFW Control Valve (CV) CV-3-2818 to the 3C Steam Generator (SG). At Turkey Point, AFW is a shared system, and the opposite unit supplies IA to the train 1 AFW CVs. Further, Nitrogen bottles provide the safety grade backup to the CVs (e.g., on a loss of IA). At the time of the discovery, Unit 3 train 1 was out-of-service for planned maintenance. The licensee wrote CR No. 97-1319 to document the issue. A previous CR (No. 97-753) had been written to address lock wiring these CVs. Corrective actions were in progress.

The inspectors concluded that Unit 3 AFW system was appropriately aligned for the condition at the time. Corrective actions were verified

to be completed. Further, the Unit 4 AFW system was adequately aligned to support unit restart.

02.4 High Head Safety Injection and Cold Leg Accumulators Walk Down

a. Inspection Scope (71707 and 60710).

The inspectors walked down the Unit 3 and Unit 4 high head safety injection system, and the Unit 4 cold leg accumulators.

b. Observation and Findings

The cold leg accumulators were walked down during the Unit 4 refueling outage. The high head safety injection systems were walked down at various times during the inspection period. The inspectors reviewed lineup procedures and prints, and verified system lineups in the field and in the control room. Portions of the surveillance testing were observed and reviewed. Valves in the systems were correctly positioned and the inspectors did not identify any leaks, bent stems, missing hand wheels or incorrect labeling. In addition, the inspectors verified that the required locked valves were locked in the appropriate position. The local and remote position indicators and instruments were compared and the remote instrumentations were functional. Appropriate levels of house keeping cleanliness were observed. There were some discussions with the systems engineers regarding lineups and PWO tags on the systems. These issues were minor in nature. Applicable sections of the UFSAR were reviewed and no deviations were found.

During the inspection period, the licensee identified a small loss of pressure in the 4C accumulator. The leak rate had been identified at a constant 2 psig/hr. The control room was pressurizing the accumulator once every shift to maintain the TS limits. The licensee entered containment to leak check the lines. One valve was identified which had a very small leak, but the leak rate was not consistent with the pressure loss data that was being experienced. A subsequent inspection revealed that the flux mapper regulator relief valve was leaking. The regulator was isolated and the licensee verified that this was the failed component. The flux mapper regulator was replaced and the license continued to monitor the pressure on the accumulator. The results of the data indicated that leak had been stopped. However, the licensee was addressing the repair of the second valve that had been found with a small leak, and indicated that they planned to take action to repair the valve. Throughout the licensee's investigation of the leak, the inspectors reviewed with the system engineer the ongoing activities, system prints, and the impact to the system and operations. Although the leak was very small, the inspectors noted that systems engineering took prompt action in attempts to identify and repair the leak.

c. Conclusions

The inspectors concluded that the Unit 4 cold leg accumulators, and the common Unit 3 and 4 high head safety injection systems were well maintained and were lined up as required for the current plant conditions. Systems engineering took prompt and appropriate action in identifying and repairing the leak in the 4C accumulator.

07 Quality Assurance in Operations

07.1 Unit 4 Startup Readiness

a. Inspection Scope (40500, 71707 and 71711)

The inspectors evaluated the licensee's process to assure Unit 4 readiness for restart after the Cycle 17 refueling outage.

b. Observation and Findings

In addition to the normal general operating procedural controls for heatup and startup (procedures 4-GOP-503, Cold Shutdown to Hot Standby, and 4-GOP-301, Hot Standby to Power Operations), the licensee performed independent verifications and checks by implementing administrative procedure O-ADM-529, Unit Restart Readiness. This included:

- System Engineer completion of readiness checklists for their specific systems;
- Review of the clearance log, open issues (PMAIs, fire impairments, PC/Ms, TSAs, condition reports, system lineups, and surveillances);
- Letters from each department head documenting readiness for restart;
- PNSC reviewed readiness; and
- Plant General Manager and site VP walkdowns, final review, and determination.

The inspectors assessed the licensee's process, attended selected PNSC meetings, reviewed the completed restart readiness procedure, and discussed the process with licensee management. The inspectors concluded that this process appeared effective and demonstrated conservatism in assuring that Unit 4 would be safely returned to service following the refueling outage.

The inspectors independently assessed Unit 4 restart readiness by reviewing work status, verifying selected system lineups, touring the facility, walking down the control room, reviewing PC/M completion status, reviewing surveillance testing status and monitoring operator readiness.

c. Conclusions

The inspectors concluded that Unit 4 was ready to support power operation following the refueling. Management's self-assessment processes, including the restart readiness procedure and process discussed above, were noteworthy.

07.2 Independent Reviews and Self Assessment (40500)

The inspectors attended a portion of the Company Nuclear Review Board (CNRB) meeting No. 447 held at Turkey Point on October 21, 1997. The inspectors verified that the meeting was conducted in accordance with Technical Specification 6.5.2, NP-803 (Nuclear Policy-CNRB), and the CNRB implementing procedures. The CNRB normally meets eight times a year, rotating the location of the meeting between the two FPL sites (i.e., Turkey Point and St. Lucie). Usually representatives from the sites, headquarters, and consultants are present at each meeting.

The inspectors also attended several PNSC meetings that involved activities that were being inspected in greater detail, i.e., valve repairs, restart issues, operation events, etc. Technical specification and procedure requirements were verified, including meeting frequency, quorum, and review responsibilities.

The inspectors concluded that the CNRB and PNSC meetings conformed to procedures guidelines. Excellent safety focus was noted by safety committee members. The CNRB complemented the site on a strong reactivity management program. Further, the CNRB early warning performance indicator program continued to demonstrate a proactive posture.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope

Maintenance and surveillance test activities were witnessed or reviewed. The inspectors witnessed or reviewed portions of the following maintenance activities in progress:

- 4B RCP work (Section M1.2)
- Diesel driven fire pump work (Section M1.4)
- MOV-4-744 A and B work (Section M2.1)
- MOV-4-751 equalizing line repair (Section M2.2)

- Security diesel troubleshooting (Section S2.1)

The inspectors witnessed or reviewed portions of the following test activities:

- Unit 4 restart testing (Section O1.2)
- Unit 4 startup and low power physics testing (Section E1.1)
- Unit 4 integrated safeguards testing (Section M1.3)

b. Observations and Findings

For those maintenance and surveillance activities observed or reviewed, the inspectors determined that the activities were conducted in a satisfactory manner and that the work was properly performed in accordance with approved maintenance work orders.

The inspectors also determined that the above testing activities were performed in a satisfactory manner and met the requirements of the technical specifications.

c. Conclusions

Observed maintenance and surveillance activities were well performed.

M1.2 4B Reactor Coolant Pump (RCP) Repair

a. Inspection Scope (62707)

The inspectors reviewed the activities associated with the repair of an identified main flange gasket leak on the 4B RCP.

b. Observations and Findings

On September 8, 1997, during the Unit 4 Cycle 17 refueling outage, boric acid was found on the 4B RCP main pump casing flange to thermal barrier gasket area. The licensee proceeded to disassemble the 4B RCP to repair the leak. Original scope for this RCP was motor work and seal maintenance only. Thus, the scope was considerably increased.

The inspectors reviewed the following documents:

- CR No. 97-1418, documenting findings, actions, and assessments,
- Westinghouse guidance and inspection results,
- Non-destructive Examination (NDE) reports,
- NRC relief request approval (TAC M99653) and FPL request (L-97-248) for bolting ISI,

- RCP drawings,
- ALARA reviews, dose estimates, and ALARA Review Board (ARB) activities,
- Procedure FLA-PMS-P1.62, RCP Main Flange Stud Relax and Restretch,
- Westinghouse loose parts evaluation (SECL-97-200) and FPL review (PTN-ENG-97-606), and
- PWO 97020210.

The inspectors observed portions of maintenance and HP activities. The original dose estimate was about 30 Rem; however, aggressive ALARA reviews and ARB activities resulted in a total job dose of 15 Rem. The inspectors verified that the required inspections were completed, and that the relief request approved by NRR was appropriately implemented.

The inspectors noted very good field supervision, strong procedure compliance, and effective dose considerations. Overall, the 4B RCP was well planned and effectively implemented considering the work was emergent. The work delayed outage completion by several days.

c. Conclusions

The 4B RCP repair activities were well planned and implemented; ALARA considerations and ARB activities were aggressive and resulted in dose savings. Maintenance supervision and oversight, and engineering support of the repair activities were strong.

M1.3 Unit 4 Integrated Safeguards Testing (61701 and 61726)

During the period October 3-4, 1997, the licensee performed Unit 4 procedures 4-OSP-201.1, Train A Engineered Safeguards Integrated Test, and 4-OSP-203.2, Train B Engineered Safeguards Integrated Test. Technical Specifications required testing of the various engineered safeguards features including Safety Injection with and without off-site power, containment phase A and B isolation, loss of off-site power, feedwater isolation, main steam line isolation, control room ventilation isolation, and containment ventilation isolation.

The inspectors observed portions of these tests and verified selected test results. One system abnormal response during Train A was evaluated as satisfactory. No significant problems were noted. The inspectors concluded that the Unit 4 integrated safeguards testing was well planned and conducted, with excellent SRO oversight and strong procedure compliance.

M1.4 Diesel Driven Fire Pump (DDFP) Maintenance (62707)

The licensee performed an 18 Month PM on the DDFP. The PM was performed in accordance with procedure 0-PMM-016.1, Diesel Fire Pump Engine 18

Month Maintenance Inspection, and WO 97017928. The procedure covered changing oil and filters, lubrication, checking the water and fuel pumps, checking/replacing belts and hoses, and checking the overspeed trip, etc.

The Cummins diesel representative was present for DDFP work activities. Other related work included fire protection valve maintenance and related corrective backlog activities. Per procedures O-ADM-016, Fire Protection Program, and O-ADM-210, On-Line Maintenance/Work Coordination, the licensee entered a seven day administrative action statement and worked the job per the "hot-items-list." Normally, work on the "hot-items-list is performed around-the-clock, and scheduled for less than half of the action statement. However, the DDFP work was only scheduled for day shifts on four consecutive days. The inspectors discussed this issue with plant management who stated they would address this issue in ADM procedure enhancements.

The inspectors witnessed portions of maintenance activities, including the PMT after completion of the maintenance, and concluded that the work was appropriately conducted. The inspectors also reviewed the operations clearance and discussed the work and interfaces with licensee personnel.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Motor Operated Valve (MOV) Modification

a. Inspection Scope (37551 and 62707)

The inspectors reviewed a modification that was performed on MOV 4-744A and MOV 4-744B, observed maintenance field work in progress, and assessed the engineering support of this modification. The purpose of this modification was to install an equalizing line to prevent hydraulic lock of the valves. These valves are the Residual Heat Removal (RHR) and low pressure Safety Injection (SI) injection valves.

b. Observations and Findings

During the NRC Generic Letter 89-10 inspection (NRC Inspection Report No. 50-250,251/97-08), the inspectors found that the licensee had identified two motor operated valves, MOV 4-744A and MOV 4-744B, as being susceptible to hydraulic lock. This modification addressed the long-term corrective actions to prevent hydraulic lock of these two MOVs. The work was described in Plant Change/Modification (PC/M) 97-026.

MOV hydraulic lock would be prevented by installing a pressure equalizing line from the bonnet to the downstream side of the RCS. The two equalizing lines (one from each valve) would be joined and connected upstream of vent valve 4-4922. A modification to the valve packing arrangement was required. The original valve packing consisted of a lantern ring located at the packing gland leak off connection. There

was a set of packing above the lantern ring and another set of packing below the lantern ring. The modification required the lower set of packing to be removed and replaced with carbon spacers. This configuration would allow the MOV bonnet to be at the same pressure of the down stream RCS side, thus preventing pressure buildup in the valve bonnet area.

The inspectors reviewed the work package, the 10 CFR 50.59 screening, and the planning/scheduling of the modification activities. The 50.59 screening was thorough, and a good basis was presented to justify the conclusions of each part of the screening. The work package was well written. There were explicit instructions describing key activities in the welding work, valve packing, and post maintenance testing procedures. Quality Control (QC) hold points were appropriately included on safety significant tasks, and good working schematics were included in the work package. In addition, the inspectors reviewed the work package with the mechanical foreman, and concluded that the foreman was very well versed with the prefabrication requirements, such as the welding, post welding NDE, and installation of the modification and its purpose. Also, the inspectors observed the foreman review the work order, specifically the welding requirements, with the welders prior to starting some welding work on the pre-fabricated tubing lines.

The inspectors observed portions of the maintenance work with the valve repacking and installation of the equalizing lines, the MOV testing (MOVATS), attended several of the Plant Nuclear Safety Committee (PNSC) meetings relating to this modification, and verified post modification testing.

The inspectors noted very good field maintenance supervision, QC and engineering oversight throughout the ongoing maintenance work. For example, on a number of occasions observed by the inspectors, the welding engineer inspected a number of joints prior to the welding and in one instance found some dirt on one joint. He asked that it be cleaned up. The QC inspector reviewed procedures, requested purging checks of oxygen and requested additional temperature measurements be taken between weld passes.

The mechanics and welding crews consisted of Turkey Point full time employees, FPL temporary employees, and valve maintenance contractors hired for the outage. The mechanics knowledge of the work they were performing was noteworthy. For example, the inspectors reviewed and discussed various portions of the valve work with the mechanics, such as the welding, valve repack, and MOVATS testing, and noted that the mechanics were very confident and knowledgeable with their portion of the work and with the procedures they were using.

Overall the modification proceeded as planned. However, two issues developed during the modification installation. The first issue was when an inspection revealed that the MOV 4-744A had scratches on the stem. These scratches were observed during MOVATS testing. The inspectors reviewed the stem scratches in the field with the valve

engineer, and reviewed engineering's assessment of the root cause of the scratches and the corrective actions. Engineering concluded that the scratches were due to the lantern ring binding against the valve stem. Corrective actions included eliminating the lantern ring and replacing it with a carbon spacer. This change was reviewed with the licensee's packing vendor and the licensee noted that this packing change was a common industry practice. A second issue developed when three body-to-bonnet studs were rejected during an inspection of the studs. It appeared the studs had been damaged in the threaded area. There was also discussions of boron on the threads. The inspectors noted that the appropriate engineering and QC disciplines reviewed the issue. After a clean-up of the studs and additional measurements, it was concluded that the studs were acceptable.

The inspectors reviewed the proposed changes for the UFSAR as a result of the modification: Two issues were identified. First, a correction was required describing that the lower half of the packing on the MOV 4-744A/B valves were no longer part of the valve sealing package. Secondly, as described above, due to the scratches on the MOV 4-744A valve, the licensee made a second design change to the valve packing. Namely, on the MOV 4-744A valve, the licensee removed the lantern ring and replaced it with a carbon spacer. The inspectors noted that this information had also not been corrected in the UFSAR change package. The licensee is currently addressing this issue.

c. Conclusions

The inspectors found that MOV 4-744A/B related modifications were very well written, planned and executed. QC and engineering oversight and support was excellent. However, a weakness was noted on the licensee's proposed revision to the UFSAR.

M2.2 Motor Operated Valve (MOV) Equalizing Line

a. Inspection Scope (62707 and 37551)

During a Unit 4 containment walk down, the inspectors found what appeared to be a missing clamp on a 3/8-inch equalizing tubing line that came out of MOV-4-751. The inspectors communicated the finding to the licensee and reviewed the licensee's corrective actions.

b. Observations and Findings

MOV-4-751 has a bonnet equalizing line installed to prevent hydraulic lock. The MOV is in the RHR system and serves as a pump suction valve. The equalizing line tubing is connected from the valve packing gland leak-off connection to a downstream instrument line at valve 4-750C (reactor coolant system side). The inspectors found that the equalizing tubing was not being supported. The licensee initiated an investigation and reviewed the required clamping for the equalizing line. Upon inspection, engineering found that the tubing was resting on a support member but the clamp which provided lateral support at that position was

missing. A three day condition report was then written. Engineering determined that the missing clamp was required for seismic support and therefore put Unit 4 on a Mode 4 restriction until the clamp was installed. Lastly, engineering determined that although the clamp was missing, the tubing conformed to allowable functionality criteria, and therefore no operability concerns were identified.

The condition report was closed with an unknown root cause. The licensee installed the clamp on the tubing and the inspectors verified that the clamp was installed.

c. Conclusions

Engineering was very responsive to the inspectors' questions regarding the clamping on the equalizing line, and performed prompt evaluation and corrective actions on the required clamping for the equalizing line. The root cause for the missing clamp was unknown.

M2.3 Unit 4 Containment Closeout Inspection 62707)

The inspectors toured the Unit 4 containment to assess the licensee's inspection of the conditions of the containment and to independently verify the containment condition. A number of QA/QC personnel were present performing their inspections along with maintenance and operations personnel assessing the cleanliness and completing several small jobs and surveillances. The QC group is responsible for the performance of this inspection which is described in procedure O-SMM-051.3, Containment Closeout Inspection. The QC personnel were very thorough in identifying equipment that had to be removed or corrections that were needed. Containment sump screen inspections were also performed after repairs.

The inspectors considered the Unit 4 containment to be relatively clean and ready for the change to Mode 4, and ready to support power operations.

III. Engineering

E1 Conduct of Engineering

E1.1 Unit 4 Startup and Low Power Physics Testing (71711 and 37551)

The inspectors observed portions of the Unit 4 initial criticality, startup, and low power physics testing evolutions (Section 01.2). The licensee performed procedures O-OSP-040.6, Initial Criticality After Refueling, and O-OSP-040.5 Nuclear Design Verification. These tests verified that nuclear design criteria and related predictions were satisfactory. Specific tests included critical boron concentrations, control rod worth, temperature coefficients of reactivity, and power distributions. Technical Specifications 3/4.1.1.3, 3/4.2.2 and 3/4.2.3 were also verified by the licensee.

Enhancements to the reactivity computer were completed per PC/M 97-025. This eliminated the problem of plant hookups necessary to monitor parameters during startup and low power physics testing. The unit achieved criticality at 5:08 p.m. on October 12, 1997.

The inspectors monitored portions of the testings, reviewed the test results, and independently confirmed that the acceptance criteria were met. The inspectors noted very good test coordination between operations and reactor engineering personnel. The inspectors verified that these tests were conducted in accordance with procedure 0-ADM-217, Conduct of Infrequently Performed Tests or Evolutions. Overall, the licensee test control and conduct were excellent, and overall performance was noteworthy.

E2 Engineering Support of Facilities and Equipment

E2.1 Event Response Team (ERT) Activities

a. Inspection Scope (37551)

During Unit 4 prestartup and startup activities, two ERTs were formed to review equipment anomalies.

b. Observations and Findings

On October 10, 1997, during control rod testing per procedure 0-PMI-028.3, Rod Position Hot Calibration, CRDM Stepping Test, and Rod Drop Test, rod control urgent failure alarms occurred on the 1AC power cabinet. The ERT determined that two cards (failure detection card and firing card for moveable gripper) had failed. These cards had been replaced this outage; however, post maintenance testing did not uncover the failures. One of the failures was intermittent, and one may be infant-mortality related. Replacement cards were obtained and installed, and the rod control system was tested successfully. Subsequent performance during initial criticality, low power physics testing, and unit restart and power ascension was satisfactory.

During Unit 4 turbine-generator startup activities on October 13, 1997, a main generator lock-out and turbine trip occurred during exciter breaker closure. Reactor power was 2% power, therefore no reactor trip occurred as power was below the 10% (P10) interlock. A second ERT was formed to determine cause and to recommend corrective actions. The ERT found a loose Potential Transformer (PT) fuse and inadequate PT drawer connection at the A phase output of the main generator iso-phase bus. This condition allowed a false phase-to-phase generator imbalance to occur, which caused a generator lockout and turbine trip. Repairs were effected, the system was successfully tested, and the unit was placed on-line at 8:58 p.m. on October 13, 1997.

The inspectors observed ERT activities, reviewed the ERT and CR documentation, met with management and ERT personnel, and independently

observed troubleshooting and testing in the field and from the control room.

c. Conclusions

The inspectors concluded that the ERT activities were thorough, demonstrated very good root cause assessment, and that the implemented corrective actions were appropriate and appeared to be effective.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Unit 4 Charging Pump Room High Radiation (71750)

The licensee detected a radiation hot spot in the Unit 4 charging pump room on September 21, 1997. This was in response to an unexpected indication on the inspectors' alarming dosimeter. An elbow below the RCP seal injection filter valve 4-293C was surveyed and a 600 mrem/hour reading was noted. The licensee posted the area, initiated CR No. 97-1559, shielded the hot spot, surveyed the immediate area and flushed the hot spot, and performed a root cause investigation. The licensee reviewed activities with the CVCS system since the outage started on September 8, 1997. Nine possible causes were reviewed, and all but four were eliminated. These four included seal water injection filter valve maintenance, CVCS draining for maintenance, seal water injection filter failure, or RCS crud burst activities and subsequent Refueling Water Storage Tank (RWST) cleanup.

The licensee concluded that the hot spot resulted in a high radiation area not being posted. No resultant exposures occurred based on reviews of dosimetry records. The licensee also identified that improvements were needed in the outage related RCS crud burst activities and subsequent RWST and VCS cleanup. Posted high radiation areas and temporary shielding remain in portions of the Unit 4 charging pump room on the CVCS letdown line. Further, the licensee identified enhancements in the HP and operations interface during water movements that could cause transient or shifting radiation areas.

The inspectors reviewed CR 97-1559 and discussed it with licensee management. The inspectors concluded that the licensee performed a detailed and thorough review. Corrective actions that were completed and those that are planned appeared to be appropriate. Failure to post the high radiation area was a non-repetitive, licensee identified and corrected violation, and is being treated as a non-cited violation per Section VII.B.1 of the NRC Enforcement Policy. NCV 50-250,251/97-11-02, High Radiation Area in the Unit 4 CVCS, was closed.

S2 Status of Security Facilities and Equipment

S2.1 Security Diesel Failures

a. Inspection Scope (71750)

The inspectors reviewed the licensee's activities relating to two failures of the security Caterpillar (CAT) 400 diesel generator.

b. Observations and Findings

On September 27, 1997, at 6:23 a.m., power to the 4J security load center was lost. Power to the vital security loads was then temporarily provided by the back-up 125-volt DC Battery. Prior to the power loss the normal and alternate power supplies, the 3C and the 4C 4KV buses respectively, had been taken out of service for maintenance, and the 4J load center was being powered by the CAT 400 diesel generator.

Since it was still dark outside, security established continuous patrols due to loss of perimeter lighting. At the time of the power loss, the inspector was in the nuclear entrance building observing the security activities. The entrance turnstiles failed in the locked position and the x-ray equipment and metal detectors were not operational. Employees were allowed to enter through two manned stations. At each station one guard performed a manual search and visual inspection of bags, while a second guard performed a manual frisk with a metal detector. Two additional guards were posted at the material/wheel chair gate entrance where the hand readers were operational. The security shift supervisor was monitoring the overall activities. Power from the 3C bus was restored to the 4J load center approximately 20 minutes later.

The cause of the power loss was due to a loss of voltage from the diesel generator. Electrical maintenance found a broken lug on the generator voltage regulator module. The licensee's vendor provided technical assistance and confirmed the licensee's findings. The cable was repaired and the diesel was subsequently scheduled for post maintenance tests.

On September 29, the second CAT 400 failure occurred. During the post maintenance test of the initial failure, Procedure No. 0-OP-026, CAT 400 Operation, the diesel failed to get a start signal. The root cause of the diesel start-up failure was determined to be a failed time-delay relay. On the 4J load center, there is a under voltage sensor at the 480-volt side of the step down transformer. A time-delay relay is energized if there is an under voltage condition sensed at the 4J load center. Once two seconds have elapsed, the time-delay relay's contacts close. Power is then supplied to the security diesel auto start relay, which subsequently starts the diesel. The licensee verified the failure of the time-delay relay and replaced it. Post maintenance testing was completed satisfactorily. The licensee wrote condition report No. 97-1794 to document the two security diesel failures.

The inspectors walked the CAT 400 system with the two systems engineers, reviewed the related logic and prints with the engineers, and reviewed the plant work orders for the completed maintenance on the diesels. The inspectors concluded that these two diesel failures were isolated events. Additionally, the inspectors verified that the event of the CAT 400 failure, in which the perimeter lighting was lost, was logged in the safeguards log.

During the inspection of the CAT 400 diesel events, the inspectors found that the licensee was implementing a Temporary System Alteration (TSA) to provide 480-Volt off-site power to the 4J security load center. This TSA was implemented during a planed maintenance outage of the 3C and 4C buses. The purpose of the outage was to change cable trays on common cables between the two busses. For electrical safety purposes, the 3C and the 4C power sources to the 4J load center were required to be de-energized. The maintenance work was planned for 3 days and the licensee did not want to operate the emergency CAT 400 diesel for that period of time.

c. Conclusions

Security response during the CAT 400 diesel generator failures was appropriate. The two diesel failures were determined to be isolated events. Electrical maintenance was proactive and took conservative safety measures in implementing the TSA to obtain off-site power to perform the cable tray maintenance.

F1 Control of Fire Protection Activities

F1.1 Fire Team Response (71750)

On September 26, 1997, at 8:16 a.m. operators noted smoke in the Boric Acid Transfer (BAT) and storage room. The fire team responded and appropriate ONOPs were entered. The 4A BAT pump's motor breaker tripped within several minutes, and operators and the fire team confirmed that the motor bearings had failed. No fire was observed, and no fire extinguisher needed to be used. Reflash watches were set, and fire protection and maintenance personnel responded and followed up. CR No. 97-1617 was written and motor repairs for the 4A BAT pump were completed.

The inspectors also responded to the scene and verified licensee actions. The inspectors confirmed that no fire had occurred. The 4A BATP was inspected and bearing/motor damage was confirmed. The inspectors concluded that the operators performing normal tours were proactive in noting the smoke, that fire team response was quick and professional, and that overall licensee response was good.

F2 Status of Fire Protection Facilities and Equipment

F2.1 Upgrades To Thermo-Lag Electrical Raceway Fire Barriers

a. Inspection Scope (64704)

The inspectors reviewed the upgrades and modifications in process to resolve the Thermo-Lag fire barrier issue at Turkey Point. These upgrades and modifications were evaluated for compliance to the requirements of 10 CFR 50 Appendix R.

b. Observations and Findings

In 1991, the NRC identified that Thermo-Lag fire barrier material did not perform to the manufacturer's specifications. Specifically, the Thermo-Lag material installed at most plants provided a fire resistance rating which was approximately half of the vendor's specified fire rating. NRC Bulletin 92-01 "Failure of Thermo-Lag 330 Fire Barrier System to Maintain Cabling in Wide Cable Trays and Small Conduits Free from Fire Damage" was issued which requested licensees with Thermo-Lag fire barriers to consider these fire barriers to be degraded and take appropriate compensatory measures for the areas where Thermo-Lag fire barriers were installed.

At Turkey Point, the licensee initiated compensatory measures consisting of fire watch activities using video cameras and foot patrols for the areas in which Thermo-Lag fire barriers were installed. A number of evaluations were performed and several meetings were held with the NRC staff to determine the appropriate resolution for this issue. The proposed resolutions included the following: upgrades to the fire suppression system for the Turbine Building, upgrades to portions of the existing Thermo-Lag installations, and NRC approval for the continued use of the existing Thermo-Lag installations in a number of areas in the plant. The completion schedules for the required modifications were as follows: upgrades to the 3-hour Thermo-Lag fire barrier installations, late 1998; upgrades to the Turbine Building fire suppression system, early 1999; upgrades to the one hour fire barriers installed in the Turbine Building, late 2000; and upgrades to the one hour Thermo-Lag fire barriers installed outside of the Turbine Building, December, 2001. As of the date of this inspection, the NRC had not approved this implementation schedule.

Turkey Point has a significant quantity of Thermo-Lag installed within the facility, as follows:

- Containments — 685 linear feet
- Indoor Areas — 636 linear feet
- Outdoor Areas (excluding Turbine Building) — 13,225 linear feet

- Turbine Building Outdoor Area 2,322 linear feet

Total 16,868 linear feet

As of the date of this inspection, the licensee had resolved the Thermo-Lag issue for the Containment Buildings by covering the Thermo-Lag materials with a stainless steel metal enclosure. Work was in process on the upgrades to the 3-hour Thermo-Lag fire barriers installed in various areas of the plant. Design for the upgrades to the 1-hour Thermo-Lag fire barriers was in progress with implementation of the upgrades scheduled to begin in early 1998.

THERMO-LAG RECEIPT INSPECTION AND STORAGE

The inspectors reviewed the receipt and storage of the Thermo-Lag fire barrier materials. Inspections were being performed by the licensee's QC organization of each Thermo-Lag shipment received from the vendor. The receipt inspections verified that the materials met the procurement documents. In addition, samples from each vendor's batch or lot of Thermo-Lag product were submitted to an independent laboratory for analysis to verify that the materials met the procurement specifications. The materials were segregated and were not used until the licensee concluded that the materials met the procurement requirements.

Based on a review of the licensee's receipt inspection documents, the inspectors concluded that appropriate receipt inspections were being performed. As of the date of this inspection, the licensee had purchased and received Thermo-Lag materials from 48 different lots or batches from the vendor. These materials were to be used at either St. Lucie or Turkey Point. Testing by an independent laboratory had been performed on samples from 40 lots or batches. These tests indicated that the products met the required chemical composition and the procurement specifications. Testing for samples from three additional lot/batches were in progress on the date of this inspection. The licensee had waived the testing for five lot/batches based on satisfactory results from previous tests. The licensee concluded that the previous satisfactory test results provided reasonable assurance that the materials purchased met the procurement documents. Future testing was to be performed on an as needed basis to demonstrate that the vendor was meeting the procurement specifications.

The inspectors noted that the Thermo-Lag materials were properly stored in a Level B warehouse. This warehouse was provided with a ventilation and air-conditioning system to maintain the temperature within the warehouse to the specified temperature of between 32 and 100-degree F. In addition, the appropriate shelf life of the trowel grade Thermo-Lag materials was being properly monitored. For example, the inspectors noted that a shelf life extension had been granted by engineering for 54 5-gallon containers of trowel grade 770 Thermo-Lag material. The need for this extension had been identified by the licensee and was documented by QC discrepancy report D2882127. Engineering had performed

an analysis and extended the shelf life in accordance with the provisions of Specification MN-3.21, Installation and Inspection Guidelines for Thermo-Lag Fire Barrier Materials, Revision 7.

The Thermo-Lag materials had received appropriate receipt inspections and testing and were properly stored prior to installation.

THERMO-LAG RADIANT ENERGY HEAT SHIELDS

The licensee had initially installed Thermo-Lag fire barriers on approximately 350 linear feet of conduit inside each unit's containment as noncombustible radiant energy heat shields. This installation was intended to meet the requirements of 10 CFR 50 Appendix R Section III.G for separation of redundant electrical circuits located inside of the containments and which were needed for safe shutdown following an Appendix R type fire. Subsequently, the NRC determined that the use of Thermo-Lag material inside containment was not acceptable as a radiant energy heat shield because the Thermo-Lag material was combustible. This position was documented in several NRC documents including NRC Information Notice 95-27, NRC Review of NEI "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screen Guide."

To eliminate the fire hazards associated with the Thermo-Lag material, the licensee developed plant modification PC/M 96-085, Radiant Energy Shields Inside Unit 4 Containment, Revision 4. A similar modification, PC/M 96-084, was developed for Unit 3. These modifications required the Thermo-Lag electrical raceways fire barriers to be encapsulated with 0.010-inch thick stainless steel metal sheets.

The inspectors reviewed the modification package for Unit 4, performed a walkdown inspection of Unit 4 and verified that all of the Thermo-Lag fire barriers installed on the electrical raceways inside the Unit 4 Containment Building had been enclosed with stainless steel metal sheets. The inspectors reviewed the closure documentation for modification PC/M 96-084 and noted that this work had been completed March 28, 1997, during the previous Unit 3 refueling outage.

3-HOUR THERMO-LAG FIRE BARRIER INSTALLATIONS

Three hour Thermo-Lag fire barriers were initially installed on a number of raceways to meet the separation requirements of 10 CFR 50 Appendix R Section III.G for redundant circuits required for safe shutdown following an Appendix R type fire. Subsequently, these fire barriers were found to have an actual fire resistance rating less than the required 3-hour fire rating. To correct this problem, the licensee developed PC/M 96-014, Thermo-Lag Overlay Upgrades for Indoor Fire Zones, Revision 2. This PC/M referenced the licensee's Specification MN-3.21, Installation and Inspection Guidelines for Thermo-Lag Fire Barrier Material, Revision 7, as the document to be used for the design and installation of the 3-hour fire barrier system. The design requirements were based on recent qualification testing of 3-hour fire

barriers using base layers of Thermo-Lag 330-1 materials with over layers of Thermo-Lag 770-1 material.

Three hour Thermo-Lag fire barriers were to be provided to separate redundant safe shutdown circuits installed in 13 plant areas. The design of the fire barriers in ten areas had been completed and the design of the fire barriers for the remaining three areas was in process at the time of this inspection. Installation work had been completed in five areas and was in process in three plant areas. The licensee estimated that the installation work to upgrade the 3-hour fire barriers was approximately 25 percent complete. Approximately 40 percent of the 3-hour barriers were scheduled to be upgraded by the end of 1997 and upgrade work for all of the 3-hour fire barriers was scheduled to be completed by late 1998.

The inspectors reviewed the design modification documents for PC/M 96-014 and performed an inspection of the completed work for Fire Zone 25, Electrical Equipment Room and Fire Zone 64, Elevator Vestibule. The modification package included comprehensive engineering and safety evaluations and an assessment of the design for compliance with Specification MN-3.21, Installation and Inspection Guidelines for Thermo-Lag Fire Barrier Material. Engineering evaluations were provided for modifications that deviated from the Specification.

Engineering support to the modification work was outstanding with the use of contract personnel who had extensive knowledge and experience in the design and installation of the Thermo-Lag fire barrier materials. A review of the completed work packages indicated that appropriate QC and engineering surveillance were provided for the work activities, independent verification was being provided as required, and records were being maintained to identify the lot or batch of the materials being installed.

The inspectors found that the workmanship of the completed 3-hour Thermo-Lag installations was of high quality.

c. Conclusions

Engineering design projects and construction activities were in process to eliminate the Thermo-Lag fire barrier issue at Turkey Point by December 2001.

The Thermo-Lag materials had received appropriate receipt inspections and testing and were properly stored prior to installation.

The fire hazards associated with the Thermo-Lag fire barrier materials installed inside each unit's containment had been satisfactorily eliminated by covering the material with stainless steel metal sheets. The workmanship of the completed 3-hour Thermo-Lag installations was of high quality. Engineering support for the design and installation of the modification work activities was outstanding. Appropriate QC

surveillance and independent verification of the work activities were being provided and appropriate records were being maintained.

F8 Miscellaneous Fire Protection Issues (92904)

F8.1 (Closed) URI 50-250, 251/97-06-03, RCP Oil Collection Systems.

(Open) LER 50-250/97-05, Reactor Coolant Pump Oil Collection System Outside Design Basis.

As previously reported by NRC Inspection Report 50-250, 251/97-06, in June 1997, the licensee identified the oil collection systems installed for the lubrication systems to the Reactor Coolant Pump (RCP) motors to be outside of the facility's basis of design. This system also did not meet the requirements of 10 CFR 50 Appendix R, Section III.O due to potential leakage points from the RCP motor lubrication system not being collected by the oil collection system. These potential leakage points were from either unpressurized or low pressure locations in the lubrication systems. The licensee concluded that any leakage from these low pressure areas would not be in quantities sufficient to sustain a fire and the probability of a postulated fire was not credible. The potential leakage locations were as follows: an upper oil reservoir switch assembly, a lower oil reservoir switch assembly, an upper oil reservoir drain valve, a lower oil reservoir drain valve, a drain valve for the oil cooler piping, and the joints of the flexible connection from the remote oil fill line to each RCP motor.

Loss of oil from the RCP motor lubrication systems would be detected by the oil reservoir hi/lo level alarm provided for each RCP motor. If the oil level in the oil reservoir of any RCP motor reached 1-inch above or below the normal level, an alarm would be received in the control room. The annunciator response procedure for this alarm directs the operators to monitor the oil level on the Emergency Response Data Acquisition and Display System and to refer to Procedure 3/4-ONOP-041.1, Reactor Coolant Pump Off-Normal, Revision 9/18/97, for guidance. The inspectors reviewed these procedures and interviewed control room operators and concluded that sufficient procedural guidance was provided for the plant operators to identify an oil leak from the lubrication system to one of the RCP motors and to take appropriate action. Any major oil leaks should be contained by the oil collection system. A leak from one of the potential leak points would be very small with an insignificant consequence of fire.

The licensee developed a plant modification package, PC/M 97-027, Reactor Coolant Pump Oil Collection System Modification, Revision 1, to correct the discrepancy for Unit 4. This modification was scheduled to be completed during the September/October 1997 refueling outage. The inspectors conducted an inspection of the oil collection system for RCP 4A and concluded that the original oil collection system should have caught and collected any major oil leak from the lubrication system and the modifications being made to the oil collection system should collect any potential leakage from these low pressure locations. A similar

modification, PC/M 97-046, was scheduled to be performed for the Unit 3 RCPs during the Fall 1998 refueling outage.

The failure to provide an oil collection system capable of catching and retaining all potential points of oil leakage from the lubrication system for each RCP motor is a violation of the requirements of 10 CFR 50 Appendix R Section III.O; however, this issue was identified by the licensee and appropriate action was initiated to correct this problem during the earliest available refueling outages, i.e., Fall 1997 for Unit 4 and Fall 1998 for Unit 3. Until these modifications are completed, appropriate compensatory actions were in place to identify oil leaks from one of the RCP motor's lubrication system and to take the appropriate action to address the fire hazards associated with the leak. This item is identified as NCV 50-250, 251/97-11-03, RCP Oil Collection Systems Did Not Meet the Requirements of 10 CFR 50 Appendix R, Section III.O. This licensee identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the Enforcement Manual.

The unresolved item and the NCV for this issue were closed. The LER item will remain open pending completion of the required modifications for each unit.

F8.2 NRC Information Notice (IN) 92-18, Potential for Loss of Remote Shutdown Capability During a Control Room Fire

The licensee's evaluation of this issue was documented by Evaluation JPN-PTN-SEEP-93-011 (Fire Protection Evaluation Record PTN-FPER-93-005), Safety Evaluation for Potential Loss of Remote Shutdown Capability During a Control Room Fire, Revision 0. This evaluation reviewed all of the MOVs from the Appendix R Essential Equipment List and all of the MOVs listed in Procedure 0-ONOP-105, Control Room Evaluation Procedure, to determine if spurious MOV operation could result from a control room fire which created "hot shorts" that bypassed the limit/torque switches and thermal overload protection. The evaluation concluded that the plant's MOVs were susceptible to the "hot shorts" described by IN 92-18. However, all of the MOVs were capable of being positioned in accordance with appropriate procedures following a control room fire, except for Boric Acid Injection Stop Valves 3/4-350 and Main Steam Bypass Valves 3/4-1400, 1401, and 1402. Procedures were in place for emergency alternate boration in the event that valves 3/4-350 were not operable following a control room fire. The licensee's evaluation determined that revisions to current procedures were required to prevent spurious actuation of Valves 3/4-1400, 1401 and 1402 in the event of a control room fire. The inspectors reviewed Procedures 3/4-OP-72, Main Steam System, Revision 8/11/97, and verified that this procedure had been revised to require Valves 3/4-1400, 1401 and 1402 to be closed with power to the MOVs removed during normal operation. These valves are required during startup to warm the main steam lines downstream from the main steam isolation valves. The valves are required to be closed for an Appendix R safe shutdown to prevent the blowdown and depressurization

of the steam generators and to ensure a steam supply to the auxiliary feedwater pump turbines.

The licensee's evaluation was comprehensive and included all of the MOVs controlled from the control room and required for safe plant shutdown following an Appendix R type fire. However, the licensee's evaluation considered only a single spurious MOV action whereas the current NRC staff interpretation of IN 92-18 suggests that evaluations for multiple spurious actions should be performed. The industry has objected to this position and NRC is currently reevaluating this issue. The licensee has deferred further review of this issue for Turkey Point pending NRC's resolution of this issue.

F8.3 Fire Barrier Penetration Seal Information Notices (Ins) 88-04, 88-56, and 94-28

The licensee evaluation determined that the issues associated with INs 88-04 and 88-56 were not applicable to Turkey Point. However, following the issuance of IN 94-28, a 1995 QA audit of the Turkey Point Fire Protection Program identified concerns with the lack of available documentation to demonstrate that the installed fire barrier penetration seals were bounded by tested configurations. The licensee's engineering group had performed several engineering evaluations to address this issue.

Evaluation PTN-FPER-96-024, Technical Evaluation to Compare a Sample Population of Penetration Fire Seals Against Tested Configurations, Revision 0, evaluated 20 fire barrier penetrations which were provided with a silicone elastomer seal. This evaluation found that 10 of the 20 penetration seal installations were bounded by design configurations in which documentation was available to demonstrate that the design had satisfactorily passed the required fire test. However, documentation was not available on 10 penetrations to demonstrate that the designs either were bounded by tested configuration or were provided with engineering evaluations which demonstrated that the penetration seals were satisfactory. The licensee performed an evaluation for these 10 penetrations and determined that these unbounded configurations provided a level of protection equivalent to the fire rating of the wall or to the fire hazards within the area.

Evaluation PTN-ENG-SEMS-96-045, Assessment of Fire Rated Penetration Seals, Revision 0, performed an assessment of the fire barrier penetration seals to assess the ability of the penetration seals' ability to perform their design function. This evaluation concluded that the available documentation did not provide assurance that the installed fire barrier penetration seal configurations met all of the critical features of the tested configurations and applicable industry standards. Additional evaluations were recommended to justify the existing installations without performing modifications or conducting additional testing.

Evaluation PTN-ENG-SEMS-96-056, Elastomer Fire Rated Penetration Seals, Revision 1, was an evaluation of electrical and mechanical penetration seals consisting of silicone elastomer materials to assess the ability of these seals to perform their design function. This evaluation concluded that the available documentation did not provide assurance that the configurations of the installed fire barrier penetration seal met all of the critical features of the tested configurations and applicable industry standards. However, based on the results of previous evaluations, the licensee concluded that further evaluations would find the as built configurations to be satisfactory.

Based on these evaluations, the licensee had not identified any operability concerns with the installed penetration seals. However, an assessment of all of the fire barrier penetration seals was scheduled to be performed to determine if each installed penetration seal was bounded by a tested configuration or was justified by an existing fire protection evaluation. Penetration seals not meeting either of these two conditions would be justified by an evaluation or appropriately upgraded by a plant modification. This evaluation was scheduled to be completed by late 1998. This issue is identified as Inspection Follow-up Item (IFI) 50-250, 251/97-11-04, Validation of Fire Barrier Penetration Seals, and will be reevaluated during a subsequent NRC inspection.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on October 30, 1997. The licensee acknowledged the findings present.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

Partial List of Persons Contacted

Licensee

T. V. Abbatiello, Site Quality Manager
R. J. Acosta, Director, Nuclear Assurance
J. C. Balaguero, Plant Operations Support Supervisor
P. M. Banaszak, Electrical/I&C Engineering Supervisor
T. J. Carter, Maintenance Support Supervisor
B. C. Dunn, Mechanical Systems Supervisor
R. J. Earl, QC Supervisor
S. M. Franzone, Electrical Maintenance Supervisor
J. R. Hartzog, Business Systems Manager
G. E. Hollinger, Licensing Manager
R. J. Hovey, Site Vice-President
M. P. Huba, Nuclear Materials Manager
D. E. Jernigan, Plant General Manager
T. O. Jones, Operations Supervisor
M. D. Jurmain, I&C Maintenance Supervisor
V. A. Kaminskas, Services Manager
J. E. Kirkpatrick, Fire Protection, EP, Safety Supervisor
A. N. Katz, Mechanical Maintenance Supervisor
G. D. Kuhn, Procurement Engineering Supervisor
R. J. Kundalkar, Vice President, Engineering and Licensing
M. L. Lacal, Training Manager
J. D. Lindsay, Health Physics Support
E. Lyons, Engineering Administrative Supervisor
C. L. Mowrey, Licensing Specialist
H. N. Paduano, Manager, Licensing and Special Projects
M. O. Pearce, Maintenance Manager
K. W. Petersen, Site Superintendent
T. F. Plunkett, President, Nuclear Division
K. L. Remington, System Performance Supervisor
R. E. Rose, Work Control Manager
C. V. Rossi, QA and Assessments Supervisor
W. Skelley, Plant Engineering Manager
R. N. Steinke, Chemistry Supervisor
E. A. Thompson, Engineering Manager
D. J. Tomaszewski, Systems Engineering Manager
J. Trejo, HP and Chemistry Supervisor
G. A. Warriner, Quality Surveillance Supervisor
R. G. West, Operations Manager

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, and electricians.

Partial List of Opened, Closed, and Discussed Items

Opened

50-250, 251/97-11-01	URI	Performing surveillance testing with gages not in a periodic calibration program (Section 02.1)
50-250, 251/97-11-02	NCV	High Radiation Area Unit 4 CVCS (Section R1.1)
50-250, 251/97-11-03	NCV	RCP Oil Collection Systems Did Not Meet the Requirements of 10 CFR 50 Appendix R, Section III.O (Section F8.1)
50-250, 251/97-11-04	IFI	Validation of Fire Barrier Penetration Seals (Section F8.3)

Closed

50-250, 251/97-06-03	URI	RCP Oil Collection Systems (Section F8.1)
50-250, 251/97-11-02	NCV	see above
50-250, 251/97-11-03	NCV	see above

Discussed

50-250, 251/97-05	LER	Reactor Coolant Pump Oil Collection System Outside Design Basis (Section F8.1)

List of Inspection Procedures Used

IP 37551: Onsite Engineering

IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Prevent Problems

IP 60705: Preparation for Refueling

IP 60710: Refueling Activities

IP 61701: Complex Surveillance

IP 61715: Containment Integrity Verification

IP 61726: Surveillance Observations

IP 62703: Maintenance Observations

IP 64704: Fire Protection Program

IP 71707: Plant Operation

IP 71711: Plant Restart From Refueling

IP 71750: Plant Support Activities

IP 92904: Followup - Plant Support

List of Acronyms and Abbreviations

AC	Alternating Current
ADM	Administrative (Procedure)
AFW	Auxiliary Feedwater
ALARA	As Low As Reasonably Achievable
a.m.	Ante Meridiem
ARB	Alara Review Board
ARP	Annunciator Response Procedure
BAT(P)	Boric Acid Transfer (Pump)
CAT	Caterpillar (diesel)
CFR	Code of Federal Regulations
CNRB	Company Nuclear Review Board
CR	Condition Report
CRDM	Control Rod Drive Mechanism
CV	Control Valve
CVCS	Chemical Volume Control System
DDFP	Diesel Driven Fire Pump
DPR	Power Reactor License
DRS	Division of Reactor Safety
DWST	Demineralized Water Storage Tank
EDG	Emergency Diesel Generator
e.g.	For Example
ENG	Engineering
ERT	Event Response Team
°F	Degrees Fahrenheit
FI	Flow Indicator
FL	Florida
FPER	Fire Protection Evaluation Report
FPL	Florida Power and Light
FSAR	Final Safety Analysis Report
GL	Generic Letter
GOP	General Operating Procedure
HP	Health Physics
IA	Instrument Air
I&C	Instrumentation and Control
i.e.	That Is
IFI	Inspection Follow-up Item
ISI	Inservice Inspection
KV	Kilovolt
L	Letter (licensing)
LER	Licensee Event Report
LI	Level Indicator
LPDR	Local PDR
M	Mechanical (drawing)
MOV	Motor-Operated Valve
MOVATS	MOV Acceptance Testing System
MSIV	Main Steam Isolation Valve
MSSV	Main Steam Safety Valve
NCV	Non-Cited Violation

NDE	Non-destructive examination
No.	Number
NP	Nuclear Policy
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
ONOP	Off-Normal Operating Procedure
OP	Operating Procedure
OSP	Operations Surveillance Procedure
P	Permissive (interlock)
P&ID	Piping & Instrument Drawing
P21	10 CFR Part 21
PC/M	Plant Change/Modification
PDR	Public Document Room
PI	Pressure Indicator
p.m.	Post Meridiem
PM	Preventive Maintenance
PMAI	Plant Manager Action Item
PMI	Preventive Maintenance - I&C
PMM	Preventive Maintenance - Mechanical
PNSC	Plant Nuclear Safety Committee
psig	Pounds Per Square Inch Gauge
PSS	Power System Stabilizer
PT	Potential Transformer
PTN	Project Turkey Nuclear
PWO	Plant Work Order
QA	Quality Assurance
QC	Quality Control
QI	Quality Instruction
RCO	Reactor Control Operator
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
Rem(mRem)	Roentgen Equivalent Man (milli)
RHR	Residual Heat Removal
RWST	Refueling Water Storage Tank
SEMS	Safety Evaluation Mechanical - Site
SFP	Spent Fuel Pit
SG	Steam Generator
SI	Safety Injection
SGFP	SG Feedwater Pump
SMM	Surveillance Maintenance - Mechanical
SNPO	Senior Nuclear Plant Operator
SRO	Senior Reactor Operator
SSGF	Standby Steam Generator Feed Water
TAC	NRR Work Number
TP	Temporary Procedure
TS	Technical Specification
TSA	Temporary System Alteration
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VMR	Voltage Metering Relay
VP	Vice President
WO	Work Order