UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-8931

January 20, 2006

Florida Power and Light Company
ATTN: Mr. J. A. Stall, Senior Vice President
Nuclear and Chief Nuclear Officer
P. O. Box 14000
Juno Beach, FL 33408-0420

SUBJECT: TURKEY POINT NUCLEAR PLANT - NRC SUPPLEMENTAL INSPECTION REPORT NOs. 05000250/2005011 AND 05000251/2005011

Dear Mr. Stall:

On December 9, 2005, the US Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Turkey Point, Units 3 and 4, facility. The enclosed report documents the inspection findings, which were discussed on December 9, 2005, with you and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the performance indicator for unplanned scrams per 7,000 critical hours crossing the threshold from Green (very low risk significance) to White (low to moderate risk significance) for Unit 4 in the third quarter of 2005. This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White performance indicator are understood, to independently assess the extent of condition, and to provide assurance that the corrective actions for risk significant performance issues are sufficient to address the root causes and contributing causes and to prevent recurrence. The inspection consisted of selected examination of representative records and interviews with personnel.

Based on the results of this inspection, no findings of significance were identified. The inspectors determined that the problem identification, root cause and corrective actions for the scrams were generally adequate. However, the inspectors identified several weaknesses in the thoroughness and quality of the cause evaluations and corrective actions associated with two of the three scrams. Also, a separate common cause evaluation of the three scrams failed to identify the aforementioned weaknesses. The inspectors did not find common cause aspects linking the three reactor scrams from a risk perspective. We plan to review your actions to address these weaknesses further during the next Problem Identification and Resolution Inspection. In addition, one self-revealing Green issue was identified that did not involve a violation of NRC requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document

system (ADAMS). Adams is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Joel T. Munday, Chief
Reactor Projects Branch 3
Division of Reactor Projects

Docket Nos. 50-250, 50-251
License Nos. DPR-31, DPR-41

Enclosure: Inspection Report 05000250/2005011 and 05000251/2005011
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-250, 50-251
License Nos:	DPR-31, DPR-41
Report No:	05000250/2005011, 05000251/2005011
Licensee:	Florida Power & Light Company (FP&L)
Facility:	Turkey Point Nuclear Plant, Units 3 and 4
Location:	9760 S. W. 344th Street Florida City, FL 33035
Dates:	December 5, 2005 - December 9, 2005
Inspectors:	J. Zeiler, Senior Resident Inspector D. Jones, Resident Inspector, H. B. Robinson M. Thomas, Senior Reactor Inspector
Approved by:	Joel T. Munday, Chief Reactor Projects Branch 3 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000251/2005-011, 05000251/2005-011; 12/05/2005 - 12/09/2005; Turkey Point Nuclear Power Plant, Units 3 and 4; Supplemental Inspection IP 95001 for a White performance indicator in the initiating events cornerstone, other activities.

This inspection was conducted by a senior resident inspector, a resident inspector, and a Region II senior reactor inspector. One Green self-revealing finding was identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process", Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- This supplemental inspection was conducted to assess the licensee's evaluation associated with a Unit 4 White performance indicator in the initiating events cornerstone. The Unplanned Scrams per 7,000 Critical Hours Performance Indicator crossed the threshold from Green to White in the second quarter of calendar year 2005. Specifically, the licensee experienced one reactor trip during the fourth quarter of 2004, one reactor trip during the first quarter of 2005, and one reactor trip in the second quarter of 2005. The first reactor trip, which occurred on December 25, 2004, was a manual trip from approximately 100 percent reactor power, due to loss of condenser vacuum. The second reactor trip, which occurred on March 22, 2005, was a manual trip from approximately 78 percent reactor power, due to the "A" steam generator feedwater pump motor trip and subsequent turbine runback. The third reactor trip, which occurred on June 27, 2005, was an automatic trip from approximately 100 percent reactor power due to a catastrophic failure of a newly installed main transformer.

  The licensee's problem identification, root cause and extent-of-condition evaluations, and corrective actions for the three reactor trips were generally adequate. However, the inspectors identified several weaknesses in the licensee's cause evaluation and corrective actions associated with the first two reactor trips. In addition, a separate common cause evaluation of the three reactor trips failed to identify the aforementioned weaknesses noted by the inspectors. The inspectors did not find common cause aspects linking the three reactor trips from a risk perspective.

- Green. A finding was identified for a failure to adequately design and implement a condenser slop drain modification. The inadequate modification resulted in a failed weld that caused a loss of condenser vacuum and a manual reactor trip.

  This finding is more than minor because it affected the design control and human performance attributes of the initiating events cornerstone objective of

limiting the likelihood of events that upset plant stability by causing a loss of vacuum and manual reactor trip. The finding was of very low safety significance because it did not increase the likelihood that mitigation equipment or functions would not be available. Because the affected equipment was non-safety related, no violation of regulatory requirements occurred. The direct cause of this finding involved the cross-cutting area of Human Performance.

B. Licensee-Identified Violations

None.

REPORT DETAILS

01 INSPECTION SCOPE

The purpose of this supplemental inspection was to assess the licensee's evaluation associated with a Performance Indicator (PI) for Unit 4 that crossed the threshold from Green to White in the initiating events cornerstone of the reactor safety strategic performance area. Specifically, the licensee experienced one reactor trip during the fourth quarter of 2004, one reactor trip during the first quarter of 2005, and one reactor trip in the second quarter of 2005. The cumulative effect of these trips was to cause the Unplanned Scrams per 7,000 Critical Hours PI to cross the threshold from Green to White in the third quarter of calendar year 2005. The inspectors reviewed the licensee's actions associated with these three events, reviewed plant procedures and trip data, and conducted interviews with licensee personnel to ensure that the root and contributing causes of the events were identified, understood, and appropriate corrective actions were initiated.

The licensee performed a common cause evaluation of the three reactor trips to identify performance and process issues that led to the White PI. The inspectors reviewed this evaluation to ensure that the licensee had adequately addressed the causal factors for the White PI.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who identified the issue and under what conditions.

The three Unit 4 reactor trips were self-revealing events, which occurred during the course of normal operational conditions.

The first reactor trip occurred on December 25, 2004, when the operators noticed a sudden loss of condenser vacuum with the reactor operating at 100 percent power. The operators were unsuccessful in recovering condenser vacuum using off-normal operating procedures, therefore, the reactor and turbine were manually tripped in accordance with plant procedures.

The second reactor trip occurred on March 22, 2005, when the 4P1A steam generator feedwater pump (SGFP) motor tripped on instantaneous overcurrent with the reactor operating at 100 percent power. As a result, an automatic turbine runback occurred to 78 percent power and steam generator water levels decreased to 15 percent. In accordance with plant procedures, the operators manually tripped the reactor.

The third reactor trip occurred on June 27, 2005, following an internal electrical fault of the main transformer with the reactor operating at 100 percent power. As a result of the main generator lock out generated from the fault, an automatic turbine-generator trip occurred followed by an automatic reactor trip.

b. Determination of how long the issue existed, and prior opportunities for identification.

The December 25 manual reactor trip resulted from a rapid loss of condenser vacuum. Following the reactor trip, the licensee discovered that the piping integrity of one of the four condenser slop drain lines that passed through the condenser had failed, resulting in condenser air in-leakage and a rapid loss of vacuum. The licensee's subsequent investigation during the next refueling outage revealed a failed weld between the slop drain pipe and condenser shell coupling. The failed weld was installed in October 2003 as a result of a modification that replaced all four condenser slop drains with stainless steel piping. This modification was intended to address long-standing issues that had been experienced on both units associated with degradation of carbon steel slop drain piping. Previous slop drain failures were attributed to vibration induced fretting at the U-bolt supports and exterior wall thinning due to steam flow. Unlike these previous incidents that resulted in gradual losses of condenser vacuum that could be controlled by reducing power, the December 25 incident resulted in a rapid loss of vacuum indicating a circumferential crack or shearing of the pipe. Prior to the loss of vacuum event, the licensee did not experience any condenser in-leakage problems that were related to the Unit 4 modification.

The March 22 manual reactor trip was caused by the trip of the 4P1A SGFP motor breaker on instantaneous over-current due to a fault within the pump motor. Prior to the motor trip, there were no prior indications of a motor problem. The motor had been overhauled offsite by an outside vendor in April 2002. While conducting this overhaul, the motor leads were found degraded and were replaced. During the lead replacement, the existing multi-strand flexible motor leads were spliced to lead extensions, which were stiffer cables. The licensee's investigation into the motor failure identified that an explosive short circuit fault had occurred close to this splice connection. A subsequent failure analysis identified that the cause of the short circuit was an improper splice (flex to stiff cable) that resulted in mechanical vibration of the motor leads that fractured the heat damaged multi-strand wiring of one phase due to mechanical fatigue. Potential contributing factors included: 1) surface oil and dust contamination that developed electrical tracking discharges around the splice leading to gradual melting and arcing of the multi-strand wiring, and 2) high electrical resistance due to the crimped splice connection, which eventually caused heat damage. The inspectors noted that the licensee does not have a preventive maintenance program for uniformly identifying motor lead insulation degradation unless the motor leads were very near failure. Instead, the licensee had chosen to perform time based motor rewinds and overhauls to preclude pump motor failures.

The June 27 automatic reactor trip was caused by an electrical fault of the Unit 4 main transformer. The transformer failed suddenly and catastrophically, without any prior indication of a problem. The transformer was manufactured in 2004 by VA Tech/Elin Transformatoren in Austria and was installed during the last Unit 4 refueling outage in the spring of 2005. The licensee re-analyzed all transformer testing that had been performed by the manufacturer, as well as all pre- and post-installation testing that was conducted after receiving the transformer. This review revealed no indication that the transformer was likely to fail.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issues.

The Licensee Event Report (LER) for each reactor trip documented the qualitative or quantitative plant specific safety significance. All plant safety systems operated as designed during and after each event and no radiological releases occurred. The risk associated with the unplanned scrams PI crossing the Green to White threshold was determined to be of low to moderate (White) risk. However, when assessed individually, each reactor trip was of very low risk significance (Green). The licensee evaluated the risk significance impact (core damage frequency) of having three unplanned reactor trips as 9.12 E-07 per year, which was less than the Green threshold of 1 E-06 per year. The inspectors reviewed the licensee's evaluations and assumptions with a Senior Reactor Analyst who concluded the licensee's results were reasonable.

While no NRC compliance issues were identified with the three reactor trips, a self-revealing Green finding was identified with the December 25 event. This Green Finding is addressed in Section 03.3 of this report and was related to an inadequate condenser slop drain pipe modification that resulted in the loss of condenser vacuum and manual reactor trip.

02.02 Root Cause and Extent-of-Condition Evaluation

a. Evaluation of methods used to identify root causes and contributing causes.

The licensee used combinations of different methods, e.g., interviews, cause-and-effect analysis, change analysis, and barrier analysis, to identify root and contributing causes for the three reactor trips. While the methods employed to identify root and contributing causes for the three reactor trips were generally adequate, the licensee only performed a formal root cause investigation for the June 27 reactor trip. Associated with this evaluation, the licensee employed the main transformer supplier to perform a root cause analysis of the transformer, as well as contracted a consulting engineer to perform an independent root cause analysis. An apparent cause investigation was conducted for the December 25 and March 22 reactor trips. The inspectors noted that the apparent cause investigations lacked the quality and detail of that performed by the formal root cause investigation. As a result, the inspectors identified several weaknesses in the two apparent cause investigations as documented in Section 02.02.b of this report.

The licensee performed a separate common cause evaluation to evaluate the three reactor trips, as well as the other unplanned reactor trips and lost generation events that occurred over the previous 30 months to determine common causes and programmatic weaknesses. This evaluation was documented in condition report (CR) 2005-20853 and resulted in identifying one root cause and six contributing causes. The inspectors determined that this evaluation adequately considered the various equipment, process, and human performance deficiencies involved in the three reactor trips.

b. Level of detail of the root cause evaluation.

The licensee's apparent cause evaluation of the December 25 reactor trip was documented in CR 2004-17722 and CR 2005-16017. The cause was attributed to a bi-metallic socket weld that failed due to high cycle fatigue as a result of poor welding coupled with a weak joint design and inadequate piping supports. The level of detail of the apparent cause evaluation for this trip was adequate to address the human performance error for the poor welding; however, the inspectors noted that the evaluation did not thoroughly address the poor joint design and inadequate piping support issues. The inspectors noted that a licensee maintenance welding specification that was utilized for the slop drain piping modification stated that engineering shall ensure that a bi-metallic socket weld is not located in a high vibration or corrosion (wetted) area. The inspectors determined from their review that engineering provided inadequate justification for not adhering to this requirement. The inspectors determined that engineering's non-adherence to the maintenance specification was a root/contributing cause to the weld failure. The inspectors attributed this weakness in the evaluation to the licensee not performing a more detailed formal root cause evaluation. The licensee acknowledged this weakness by initiating CR 2005-33920, Human Performance Issue Associated with Condenser Slop Drain Apparent Cause.

The licensee's apparent cause evaluation of the March 22 reactor trip was documented in CR 2005-8330. The cause of the 4P1A SGFP motor failure was attributed to a combination of using a non-standard motor lead extension/connection by the motor overhaul vendor and the electrical tracking discharges from superficial contamination (oil and dirt) that gradually broke down the insulation of the copper cable and allowed the cable to fail. The CR also stated that time pressure and lack of oversight by Florida Power and Light (FP&L) were considered contributors for this event. The inspectors noted one weakness in the apparent cause evaluation that again, may have been the result of not performing a more detailed formal root cause evaluation. This weakness involved the lack of identification or discussion in CR 2005-8330 regarding whether all the requirements in Purchase Order (PO) 00027916 were adhered to during the SGFP 4P1A motor overhaul and replacement of the motor leads in March/April 2002. Specifically, the PO required written authorization from FP&L engineering to the vendor prior to the vendor performing work, which involved the substitution of parts used for replacement or any physical or electrical configuration changes to the motor. The inspectors interviewed licensee procurement personnel who stated that engineering authorization would generally be in the form of a response to a supplier deviation notice (SDN). The inspectors noted that replacement of the motor leads by the vendor involved both the use of substitute parts (i.e., non-standard stiffer replacement motor lead extensions) and a physical configuration change (splicing the stiffer replacement motor leads to stubs from the original existing flexible motor leads). There was no SDN from the vendor nor documentation from FP&L engineering, which authorized use of the substitute parts or the splices on the SGFP 4P1A motor leads. During discussions with the inspectors, engineering personnel indicated that, at the time of the motor overhaul, they were aware that the vendor would be using splices on the replacement motor leads. However, they did not question the vendor regarding the details of the splice. The engineering personnel further stated that they were not aware nor were they

informed by the vendor that an alternate cable would be substituted for the replacement motor lead extensions. CR 2005-8330 stated that the vendor made an independent decision to use the alternate cable.

The licensee's formal root cause evaluation of the June 27 reactor trip was documented in CR 2005-18265. The cause of the main transformer failure was attributed to a manufacturing defect in the laminated wood clamping ring that provides insulation and structural support between the high side winding layers. Due to imperfections in the laminated wood used in the clamping ring, electrical arcing occurred in the clamping ring resulting in a B phase to ground fault. The clamping rings were purchased by the transformer manufacturer from another supplier. The clamping rings were quality checked by this supplier by scanning for metal inclusions and not for potential voids in the material. The transformer manufacturer reported that it had used the same clamping ring supplier for over 20 years without any failures of this nature. The licensee identified two contributing causes to the failure including: 1) the use of a transformer core form design, which used a clamping ring versus a non-clamping ring design, and 2) the lack of industry wide testing to identify voids in laminated wood material used in clamping rings. In addition, the licensee identified two missed opportunities during their investigation including: 1) not consulting the industry in developing transformer core design specifications, and 2) not employing an independent consultant to review the transformer design proposed by the manufacturer and oversee the construction process. The inspectors determined that the evaluation of this root cause analysis was sufficiently detailed to support the root and contributing causes.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience.

The inspectors determined that the cause evaluations for the three reactor trips properly considered prior occurrences of similar problems where applicable.

d. Consideration of potential common causes and extent of condition of the problem.

The inspectors' review of the three reactor trips verified that there were no equipment or system related common causes, which could be linked to the failures. All three reactor trips were caused by non-safety-related secondary side equipment failures. As previously discussed in Section 02.02.b, the inspectors identified two weaknesses in the licensee's cause evaluations involving a lack of thoroughness of the extent of condition reviews as follows:

- for the December 25 reactor trip, the licensee did not sufficiently address engineering's non-adherence to a maintenance specification that was determined by the inspectors to be a root/contributing cause to the weld failure, and,

- for the March 22 reactor trip, the licensee did not address why requirements in the PO for overhauling the 4P1A SGFP motor requiring written authorization from engineering prior to the vendor performing work that involved the

substitution of parts or any physical or electrical configuration changes, were not adhered to.

In response to the three reactor trips that led to the White PI, the licensee performed a separate common cause evaluation that was documented in CR 2005-20853. The purpose of this evaluation was to review the common causal factors of 34 unplanned reactor trips and downpower events during the last 30 months (from January 2003 - August 2005) for Turkey Point, as well as St. Lucie Nuclear Power Plant. The licensee identified one root cause and six contributing causes as a result of this evaluation. The root cause was:

- work standards and programmatic controls for secondary side non-safety related equipment important to plant reliability were not maintained at the appropriate level consistent with the risk to unit generation or reliability.

The contributing causes identified by the licensee were:

- ineffective work practices for critical secondary equipment refurbishment and maintenance,
- inconsistent detail in secondary work packages with maintenance personnel knowledge,
- insufficient vendor and contractor guidelines,
- inadequate supervisory oversight for replacement or refurbishment of equipment and maintenance,
- lack of programmatic controls for supplemental personnel human performance training and qualifications, and,
- lack of attention to equipment condition aging, wear and tear, fatigue, and corrosion.

The licensee determined that, for the most part, corrective actions from a previous common cause evaluation conducted in December 2004 (CR 2004-18025) and a self-assessment conducted in February 2005 (CR 2005-1339-SA) to address the recognized increased trend in reactor trips and downpower events had already begun to address these same root and contributing causes. However, the licensee's evaluation identified that additional efforts were needed in the areas of control of contractor personnel and oversight of offsite vendors performing work on secondary plant components. The inspectors reviewed the common cause evaluation and determined that it was generally adequate; however, a missed opportunity existed concerning the licensee's failure to identify the cause evaluation and corrective action weaknesses that the inspectors noted from their reviews as discussed in Section 02.02.b and Section 02.03.a of this report.

02.03 Corrective Actions

a. Appropriateness of corrective actions.

For the December 25 reactor trip, the licensee took prompt corrective action by manually tripping the reactor and isolating the slop drain lines prior to commencing start-

up. To address the apparent cause discussed in Section 02.02.b of this report, the licensee's corrective actions included replacement of all slop drain bi-metallic socket welds with full penetration butt welds on both units. The licensee also established a corrective action to revise the weld control manual to add augmented inspection requirements for non-nuclear welds that were critical to unit operation. In addition, the qualifications of the welder who performed the welding error was terminated until mandatory retesting could be conducted. The inspectors determined that the corrective actions were appropriate and adequate to address the apparent cause identified by the licensee. However, the licensee had not established any corrective actions for the inadequate engineering design input that was identified as a root/contributing cause by the inspectors. The licensee initiated CR 2005-33920 to evaluate whether additional corrective actions were necessary to address this issue.

For the March 22 reactor trip, the licensee's corrective actions included repair of the failed 4P1A SGFP motor using motor lead wiring insulation, which was better suited for an oil environment. The oil seals associated with the motor were replaced to reduce the potential for oil leaks. Representatives from FP&L witnessed aspects of the offsite repairs to provide additional oversight of the vendor's activities. The inspectors identified two weaknesses with the licensee's long term corrective actions as follows:

- The first weakness involved inadequate translation of a corrective action to prevent recurrence (CAPR) from CR 2005-8330 into the motor overhaul specification (SPEC-E-008, FPL Motor Repair Requirements Specification - PTN & PSL). The CAPR to address replacement of motor leads stated that SPEC-E-008 needed to be revised to state that all re-leads will go back to the coil connection; will not re-lead with different materials (to prevent future rigid to flexible splices being made); and for motors which are susceptible to internal oil leaks, should specify better oil resistant lead insulation material. However, the actual change that was incorporated into SPEC-E-008 was more general in nature and stated that motor lead wire size and manufacturer shall be documented in the Motor Repair Report. The inspectors noted that the revision to SPEC-E-008 did not require the vendor to document this information in the Repair Plan, which is required to be submitted to the licensee prior to the vendor performing any repairs. The licensee initiated CR 2005-33762 to revise SPEC-E-008 to address this weakness in the implementation of this CAPR.

- The second weakness involved the licensee's failure to address one of the contributing causes identified in CR 2005-8330. The CR stated that time pressure and lack of oversight by FP&L were contributing causes to the 4P1A SGFP motor failure. The CR provided corrective actions to address the lack of oversight issue. With regard to the time pressure issue, CR 2005-8330 stated that the different size motor leads were spliced together because the vendor did not have the original cable available and procurement involved a long lead time. A long lead time could not be supported as there was time pressure on the vendor to return the motor to Turkey Point because the unit was in an outage. Based on time pressure and availability, the vendor made an independent decision to use the alternate cable. The inspectors noted that there was no

evaluation or discussion of corrective actions in CR 2005-8330 to address the time pressure contributing cause.

For the June 27 reactor trip, the licensee removed the damaged main transformer and successfully re-installed the old main transformer. Extensive testing was conducted on the old main transformer to provide appropriate assurance that it would operate reliably. The licensee's long term corrective actions included: 1) identify critical transformer manufacturing attributes and provide a means for adequate oversight during the manufacturing of replacement large transformers; 2) provide an independent consultant to oversee the design and construction of a new main transformer to be installed during the Spring 2008 Unit 4 refueling outage; 3) develop a plan to assess the condition of the new operating Unit 3 main transformer that was manufactured by the same vendor and might be susceptible to a similar failure; 4) evaluate the clamping ring material used in other large transformers onsite; and, 5) ensure the new main transformer to be purchased used press board in the clamping ring manufacture versus laminated wood. The inspectors determined that the licensee's corrective actions were appropriate and adequate to address the root and contributing causes.

b. Prioritization of corrective actions.

The inspectors determined that the corrective actions for the three reactor trips were adequately prioritized.

c. Establishment of a schedule for implementing and completing the corrective actions

The inspectors verified that the licensee's corrective action program identified assigned individuals, completion dates, and reference numbers to ensure that individual corrective actions would be completed in accordance with their priority.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The inspectors determined that effectiveness reviews had been scheduled for all three reactor trips. These effectiveness reviews were planned upon completion of the applicable corrective actions.

03 OTHER ACTIVITIES

.1 Review of licensee process of procuring, ordering, manufacturer oversight, receipt inspection, field implementation, and on-the-job oversight of vendor parts and services

The inspectors noted that CR 2005-8330 documented a weakness in the licensee's control and oversight of vendor supplied materials and/or services. This weakness had been identified previously by the licensee in CR 2004-17947. The inspectors reviewed licensee administrative procedures (which controlled the purchase, repair, and use of material, equipment, and services supplied by offsite vendors) to verify that the licensee had implemented corrective actions to address the identified weaknesses related to

vendor oversight. The inspectors noted that the licensee revised existing procedures and implemented new procedures to strengthen the controls and oversight of vendor supplied materials and services related to both safety related and non-safety related activities. Changes included developing a list of critical attributes (with respect to procurement or repair of critical motors); adding engineering and/or Quality Assurance hold points to inspect critical attributes; and, requiring vendors to submit a repair plan prior to performing work. The documents reviewed by the inspectors are listed in the Attachment.

The inspectors reviewed purchase orders related to the repair of a safety related intake cooling water pump and a non-safety related circulating water pump motor. The inspectors noted that these repairs were being performed in accordance with the licensee's increased controls and oversight of vendor activities.

.2 Review of Management Observation Program

The inspectors reviewed licensee procedure PGM-LOI-02-004, "Human Performance Program Manual," approved August 6, 2003. Section 5.1.1 of this procedure entitled "Site-Wide Observation Program" requires in-field monitoring of employee performance and job-site conditions to be conducted by managers/supervisors in each department. The purpose of these observations was to identify, correct, and discourage negative behaviors, as well as identify and reinforce positive behaviors by employees. Specific observations were entered into the Station Issue Tracking and Information System (SITRIS) database. The information captured from the observations were included in the licensee's quarterly Corrective Action Program Trend Report.

The inspectors reviewed a sample of observations documented by management personnel during November 2005 and reviewed the Observation Program inputs to the Corrective Action Program Trend Report for the first through third quarters of 2005. The inspectors determined that the observation program was being implemented as directed by PGM-LOI-02-004; however, a limited number of cross-discipline department observations were being conducted and some observations failed to provide specific comments when the evaluation category was checked as "Unsatisfactory or "Opportunity for Improvement." In addition, based on review of the Corrective Action Trend Reports, trending information related to the observation program was limited to the number of observations being performed by department versus focusing on insights into employee performance.

.3 (Closed) LER 05000251/2003-004-00: Manual Reactor Trip Due to Lowering Condenser Vacuum

and,

(Closed) LER 05000251/2004-004-01: Manual Reactor Trip Due to Lowering Condenser Vacuum

a. Inspection Scope

The inspectors reviewed the subject LERs and CRs 2004-17772 and 2005-16017 to assess the circumstances associated with a loss of condenser vacuum and manual reactor trip that occurred on December 25, 2004.

b. Findings

Introduction. The inspectors identified a Green finding associated with the inadequate design and implementation of a condenser slop drain modification that resulted in the loss of condenser vacuum and subsequent manual reactor trip.

Description. In August 2003, Unit 3 experienced a sudden loss of vacuum due to a failure of the slop drain piping. The licensee's investigation (CR 2003-2861) identified flow induced vibration as one of the causes of the piping failure. With Unit 4 entering a refueling outage, this event prompted the emergent replacement of Unit 4's slop drain lines. In October, 2003, the licensee implemented Work Order (WO) 33003579-02 to replace the carbon steel slop drain piping with stainless steel. This WO implemented the requirements of Specification No. M-49 that provided the requirements for the generic replacement of carbon steel piping with stainless steel. Section 5.9.8 of this specification required that engineering ensure that bi-metallic socket welds are not installed in high vibration or corrosion (wetted) areas. In Maintenance Request for Assistance No. 33003579-02, dated October 3, 2003, engineering determined that the restriction in the specification was not applicable and authorized the use of bi-metallic socket welds. The licensee's decision to use bi-metallic socket welds was not consistent with the investigation results of CR 2003-2861 that included flow induced vibration as a cause for the August 2003, Unit 3 loss of vacuum incident and was identified as a performance deficiency.

On December 25, 2004, the Unit 4 reactor was manually tripped due to a sudden loss of vacuum. The loss of vacuum was due to the failure of one of the bi-metallic socket welds that was installed in October 2003. The FP&L research and evaluation laboratory report (PTN-TS-11461) attributed the failed socket weld to high cycle fatigue in a known vibration environment. The report also stated that the metallurgical analysis indicated a lack of penetration and lack of fusion of the carbon steel socket weld. The report further stated that fatigue failures of socket welds are fairly common in industry.

Analysis. The inspectors determined that a performance deficiency caused the socket weld failure resulting in the reactor trip as follows: 1) the licensee's inadequate design and implementation of a condenser slop drain modification that installed bi-metallic socket welds in a known vibration environment, which was contrary to welding specifications, and 2) inadequate welding by the individual who installed the socket weld. This finding is more than minor because it affected the design control and human performance attributes of the initiating events cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions, in that this finding resulted in a manual reactor trip. The inspectors determined that the finding is of very low safety significance because although it did result in a reactor trip, it

did not increase the likelihood that mitigation equipment or functions would not be available. This finding included a human performance cross-cutting aspect of inattention to detail by the welder, as well as engineering staff when they incorrectly determined that the requirements of Specification No. M-49 were not applicable to the condenser slop drain modification.

Enforcement. Because the affected equipment was non-safety related, no violation of regulatory requirements occurred. Therefore, this finding is identified as FIN 05000251/2005011-01, Inadequate Condenser Slop Drain Modification Resulted in Loss of Condenser Vacuum and Manual Reactor Trip.

.4 (Closed) LER 05000251/2005-002-00: Automatic Reactor Trip due to Turkey Point Unit 4 Main Transformer Failure

The inspectors reviewed the subject LER and CR 2005-18265 to assess the cause and licensee actions taken to address the main transformer failure that resulted in an automatic reactor trip. The cause of the trip was attributed to an internal fault on the B phase high side windings of the main transformer. Initial corrective actions included replacement of the main transformer. The root cause of the transformer failure was still under investigation at the time the LER was submitted. No new issues or additional findings of significance were identified during the LER closeout review. The root cause and corrective actions were subsequently completed and documented in CR 2005-18265. The licensee plans to submit a supplement to the LER to document the results of the completed root cause evaluation.

.5 Cross-Cutting Aspects of Findings

Section 03.3 describes a self-revealing finding for a welder failing to implement an adequate bi-metallic socket weld and inattention to detail by the engineering staff when they incorrectly determined that the requirements of a welding specification were not applicable to the condenser slop drain modification. The direct cause of this finding involved the cross-cutting area of Human Performance.

04 MANAGEMENT MEETINGS

Exit Meeting Summary

The inspectors presented the results of the supplemental inspection to Mr. A. Stall and other members of licensee management and staff on December 9, 2005. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
A. Stall, Senior VP Nuclear and Chief Nuclear Officer
W. Webster, Senior Vice President, Nuclear Operations
M. Moore, Corrective Actions Supervisor
R. Kundalkar, Vice President, Nuclear Engineering
M. Jurmain, Nuclear Materials Manager
D. Poirier, Maintenance Manager
W. Pravate, Work Controls Manager
S. Greenlee, Engineering Manager
T. Jones, Site Vice-President
M. Navin, Operations Manager
M. Pearce, Plant General Manager
B. Stamp, Operations Supervisor
T. Sweeney, Engineering Electrical Supervisor
C. Tudor, ISI NDE Supervisor

NRC personnel:
W. Rogers, Senior Reactor Analyst, Region II
W. Travers, Regional Administrator, Region II

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000251/2005011-01	FIN	Inadequate Condenser Slop Drain Modification Resulted in Loss of Condenser Vacuum and Manual Reactor Trip (Section 03.3)

Closed

05000251/2004-004-00	LER	Manual Reactor Trip Due to Lowering Condenser Vacuum (Section 03.3)
05000251/2004-004-01	LER	Manual Reactor Trip Due to Lowering Condenser Vacuum (Section 03.3)
05000251/2005-002-00	LER	Automatic Reactor Trip due to Turkey Point Unit 4 Main Transformer Failure (Section 03.4)

Discussed

None

LIST OF DOCUMENTS REVIEWED

Procedures
0-ADM-005, Control of On-Site Services, Rev. dated 10/7/05
0-ADM-080, Controlling Purchase, Repair and Use of Material and Equipment for High Functional Importance Applications, Rev. dated 10/31/05
ENG-QI-4.10, Supplier Deviation Notices (SDN) Rev. 4
NAP-204, Condition Reporting, Rev. 6
QI 4-ISC-1, Procurement Control, Rev. 5
SPEC-E-008, FPL Motor Repair Requirements Specification - PTN & PSL, Rev. 3
Integrated Supply Chain Technique Sheet TS 4.4, Repair/Warranty by Vendor, Rev. 4
NAP-407, Equipment Reliability, Rev. 1
PGM-LOI-02-004, Human Performance Program Manual, Rev. dated 8/6/03

Licensee Event Reports (LERs)
2004-004-00, Manual Reactor Trip Due to Lowering Condenser Vacuum
2004-004-01, Manual Reactor Trip Due to Lowering Condenser Vacuum
2005-001-00, Steam Generator Feedwater Pump Trip Leading to Manual Reactor Trip and Auxiliary Feedwater Actuation
2005--002-00, Automatic Reactor Trip Due to Turkey Point Unit 4 Main Transformer Failure

Condition Reports (CR)
2005-20853, Collective evaluation for unplanned scrams NRC performance indicator
2005-16017, Unit 4 manual reactor trip due to loss of condenser vacuum from a failed slop drain
2005-10827, PT4-22 condenser inspection
2004-17722, Manual reactor trip due to lowering condenser vacuum
2004-18025, Three manual reactor trips have occurred within the past two weeks
2004-17754, Unit 4 manual reactor trip due to lowering condenser vacuum
03-3078, Main condenser inspection during the unit 4 cycle 21 refueling outage
03-0448, Deficiencies noted during the unit 3 refueling outage main condenser inspection
03-2861, Unit 3 experienced a sudden loss of condenser vacuum with corresponding loss of megawatts
2005-8330, Unit 4 reactor trip
2004-17947, Vendor control deficiencies
2005-18265, Unit 4 main transformer damage
2005-21470, Turbine team follow-up actions tracking resulting from effectiveness review of common cause analysis recommendations
2005-20853, Unit 4 performance indicator for Unplanned Scrams Per 7000 Critical Hours is calculated to change from Green to White for the 3rd quarter 2005

Self-Assessments
2005-1339-SA, Turkey Point Forced Megawatt Loss Common Cause Assessment Report

Work Orders
31020995-01, Slop drain flange has air in leakage
33005115-01, Replace south end slop drain
33005114-01, Replace north slop drain piping

33003570-01, Condenser clean and inspect
33003579-01, Condenser emergent repairs
33003579-02, Slop drain piping replacement

Miscellaneous
Maintenance Request for Assistance, MRA 33003579-02, Slop drain piping leaking inside condenser, replace carbon steel piping with stainless steel (Unit 4)
Specification, SPEC M-49, Replacement of Quality Related and Not Nuclear Safety Carbon Steel Piping for Turkey Point Units 3 and 4
Procedure ENG-QI 4.5, Specifications, Rev. 8
Discipline Standard, STD-W-010, Examination Requirements for Welds Turkey Point Unit 3 and 4
Maintenance Support Package, MSP 05-052, Turbine Slop Drain Nozzle Replacement
Maintenance Support Package, MSP 05-092, Turbine Slop Drain Nozzle Replacement
Test Report: PTN-TS-11461, Evaluate Cause of Weld Fracture of 1-1/4" Slop Drain from Turkey Point Nuclear Plant, April 29, 2005
Purchase Order 00027916, Blanket Release 013 (included SGFP 4P1A motor), Rev. 0, 1, 2, 3
Purchase Order 00081054 (Intake Cooling Water pump repair), Rev. 0, 1, 2, 3, 4
Purchase Order 00088258 (Circulating Water Pump 4A2 motor repair), Rev. 0, 1
Corrective Action Program Trend Report - 1st Quarter 2005
Corrective Action Program Trend Report - 2nd Quarter 2005
Corrective Action Program Trend Report - 3rd Quarter 2005