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 HARRIS,K.N. Florida Power & Light Co.  
 RECIP.NAME RECIPIENT AFFILIATION  
 EBNETER,S.D. Region 2, Ofc of the Director

SUBJECT: Supplemental response to NRC ltr re violations noted in  
 Maint Team Insp Repts 50-250/88-32 & 50-251/88-32.

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July 31, 1989

L-89-278

Mr. Stewart D. Ebnetter  
Regional Administrator  
U.S. Nuclear Regulatory Commission, Region II  
101 Marietta Street, Northwest, Suite 2900  
Atlanta, Georgia 30323

Re: Turkey Point Units 3 and 4  
Docket Nos. 50-250 and 50-251  
Inspection Report 88-32  
Supplemental Response to NRC Maintenance Team Inspection

Dear Mr. Ebnetter:

On May 4, 1989, Florida Power & Light Company (FPL) responded to the Notice of Violation associated with the NRC's Maintenance Team Inspection (MTI) at Turkey Point. In addition, at our April 28, 1989 meeting with you in Atlanta, we committed to provide you with a description of our actions to address the broader areas of weaknesses noted during the inspection by June 15, 1989. An extension of this date to July 31, 1989 was subsequently agreed to.

The cover letter accompanying the MTI report noted "an improving trend...stemming from changes in management's approach to maintenance and from newly instituted programmatic changes." We agree that there are indicators which show improvement, but it is also clear that the maintenance program at Turkey Point requires accelerated upgrading, particularly in the areas of weakness noted in the inspection report. In our July 19, 1989, management meeting with the NRC at the Turkey Point Nuclear Plant, we provided you with a number of the indicators reflecting our performance in maintenance, and stated our objective of achieving demonstrable improvement against established maintenance performance measures and criteria. In the attachment to this letter we describe the major actions which we have taken to address the areas identified as weaknesses in the MTI, as well as the results achieved so far.


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Stewart D. Ebnetter  
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Please do not hesitate to call me should you wish to discuss these matters further.

Very truly yours,

  
K. N. Harris  
Vice President  
Turkey Point Nuclear Plant

KNH/WEB/cas/daj

Attachment

cc: Dr. Thomas E. Murley, Director, Office of NRR  
U.S.N.R.C. Document Control Desk, Washington, D. C.  
Senior Resident Inspector, Turkey Point Plant

## ATTACHMENT

The NRC team inspection of maintenance activities at the Turkey Point Nuclear Plant determined that the maintenance program for the plant was generally satisfactory from a programmatic standpoint, but that its implementation was poor. The report of the team inspection (Inspection Report Nos. 50-250/88-32 and 50-251/88-32) identified nine areas of weakness upon which the poor implementation conclusion was based. These were:

1. historically high equipment failure rates;
2. poor appearance of plant and equipment condition;
3. inadequate previous allocation of resources for parts, permanent staff, and especially technical support;
4. inadequacies in engineering support;
5. insufficient numbers of QC Inspectors;
6. newly developed good programs for job planning and work order control were poorly implemented;
7. inadequacies in procedure development;
8. poor spare parts controls; and
9. high personnel turnover rates, high overtime rates and the need for more timely personnel performance appraisals.

FPL's actions to improve performance in each of these areas, and results achieved to date, are described below.

### I. Equipment Failure Rates

To lower equipment failure rates we have identified the major, recurring contributors to: (i) unplanned days off-line; and (ii) Limiting Condition for Operation (LCO) hours (on a system basis). We have performed root cause analysis of these major contributors, and have developed and implemented actions to eliminate the identified root causes. In addition, we have taken action to improve our ability to analyze and correct root causes of equipment failures.

Nearly half of the equipment failures that contributed to unplanned days off-line in 1987 involved valve problems. Common problems were external leakage, internal leakage, and valve control problems. Root causes included inadequate preventive maintenance schedules, inadequate maintenance procedures, and weak maintenance worker training. To address these problems, FPL has conducted a review of valve preventive maintenance for valves which affect reliability (both safety-related and balance-of-plant) and has developed new schedules for preventive maintenance where appropriate. Valve maintenance procedures have also been reviewed and upgraded where necessary. Instruction on the revised procedures has been provided to key journeymen. During the recent refueling outages, more than 1,400 valves were worked using the revised procedures. This should help to significantly lower unplanned days off-line. The proportion of unplanned days off-line attributable to valve problems has decreased from 44% in 1987 to 16% in 1988.



The system which contributes most to LCO hours is the Component Cooling Water (CCW) system, which is responsible for more than 25% of all LCO hours on both units. To enhance the reliability of the CCW system, two System Engineers (one permanently assigned and one assigned as a special project) have been assigned to analyze system problems and identify means to resolve them.

A number of specific projects have been identified to enhance the reliability of the CCW System:

- (i) Replacement of CCW heat exchangers.
- (ii) Installation of a chemical injection system to reduce fouling of heat exchangers.
- (iii) An improved program to calculate heat exchanger fouling.

The new heat exchangers have been installed in Unit 4. The Unit 3 heat exchangers will be replaced during the next refueling outage. The chemical injection system has been installed and is being used on a trial basis on Unit 3. After confirmation of its effectiveness, chemical injection will be implemented in Unit 4. The improved program to calculate heat exchanger fouling has been implemented on both units. These actions are expected to reduce CCW system LCO hours substantially.

Other significant contributors to LCO hours have included problems with Residual Heat Removal (RHR) pump seals and with the Emergency Diesel Generator Fuel System. Design and operational changes have been made to address these problems. The originally specified RHR pump seals have been replaced with cartridge seals in Unit 4; the new seals have operated for over 1,000 hours without problems. Replacement seals for the Unit 3 RHR pumps are scheduled to be installed during the next refueling outage.

With respect to the diesel generator fuel system, corrective actions have included changes in fuel filter operation methods, cleaning of the fuel tanks, use of chemicals to prevent biological degradation of fuel, and improvements in chemical analysis of fuel condition. These actions are expected to reduce LCO hours associated with these components.

Other actions have been taken to improve reliability of the "black start" diesels shared by the Turkey Point fossil and nuclear units. These include implementation of an action plan for material condition upgrade of the diesels, (work pursuant to this plan has been completed on the number 5 "black start" diesel) and the assignment of a system engineer



to site diesels. Also, new instructions for the maintenance of electrical equipment associated with the diesels are under development.

From a programmatic standpoint, root cause analysis is one of the keys to cutting equipment failure rates. A number of steps have been taken or are planned to expand and sharpen our root cause analysis capability:

- (i) The role of System Engineers in root cause analysis (and other system engineer responsibilities) is clearly defined in plant procedures O-ADM-501 and O-ADM-509. Pursuant to O-ADM-501, system engineers also participate in the review and approval of plant changes and modifications (PC/Ms) to their systems.
- (ii) FPL has hired several additional System Engineers on a permanent basis -- 25 permanent System Engineers are now on site.
- (iii) Training will be provided to System Engineers on their specific assigned systems and in root cause analysis techniques. This training is scheduled to begin in September, 1989.
- (iv) Maintenance and operations personnel have been provided with a directory which gives the names of System Engineers to be contacted in the event of problems on particular systems, and are calling upon them more frequently.
- (v) Teamwork between Design and System Engineers has been enhanced by the assignment of specific System Engineers in the Corporate Staff Engineering group as counterparts to plant System Engineers. Staff Engineers assist their site counterparts in performing error modes and effects analysis, frequently performing their tasks on site.

We believe that the enhanced use of System Engineers for root cause analysis and for devising solutions to prevent the recurrence of problems, in addition to the other steps described below, will improve equipment reliability. The PM/PM+CM ratio has improved from 25% in mid-1988 to just under 60% at the end of June, 1989 (some portion of this change is attributable to the timing of unit outages). Also, as described above, the proportion of unplanned days off-line attributable to valve problems has decreased significantly. Preventive maintenance accomplished during the 1988 Unit 4 reliability outage should result in a further reduction in this figure for 1989.

Other corrective actions which should help reduce failure rates include:

- (i) Steps to reduce the I&C backlog (see Section III).
- (ii) Improved maintenance planning and scheduling (see Section VI).
- (iii) The provision of additional Maintenance and System Engineering resources (see Section III).
- (iv) Improvements in maintenance procedures (see Section VII).
- (v) Enhancing personal accountability (see Section II).



## II. Plant Material Condition

Plant material condition does not yet meet management standards. The HHSI pump room has been established as a "model area" to exemplify the material conditions expected in the plant. The establishment of other model areas is under consideration. Our aim is to improve overall plant conditions over time to match conditions in model areas.

In terms of appearance, a substantial effort has been undertaken to clean up, paint, and make insulation lagging repairs. Contract painters have been hired to systematically perform needed painting in the plant, with primary focus on the secondary plant. A coating specialist has been retained to oversee the quality of this effort.

In addition, a number of steps have been taken to improve the "real" (operational) condition of the plant as well as its appearance. For example, System Engineers are performing walk-downs of their systems to identify problems that should be corrected. As noted in Section I above, several actions have been taken to enhance system reliability by improving the condition of plant equipment, such as valves. Progress in this area is reflected in the increased numbers of preventive maintenance man-hours being worked (up to 2184 average per week in the second quarter of 1989 from 1166 average per week in the last quarter of 1988, an increase of 87%) and the increase in the PM/CM ratio as discussed in Section I.

The achievement of lasting improvements in material condition requires that personnel at every level understand management's standards and their personal responsibility for attaining plant material condition standards. We are taking the following steps to reinforce the concept of personal accountability for plant material condition:

- Weekly tours by plant management will be reinstituted now that the dual unit outage is over.
- Personnel are rated on their understanding of management standards and of their personal and department accountabilities during annual performance appraisals.
- Check lists have been developed which require Maintenance management and supervisors to perform evaluations and provide feedback to their subordinates on the quality of their performance in specified areas on a daily basis.
- INPO has been requested to perform periodic appraisals of our success in improving implementation of the maintenance program.



As noted in the July 19, 1989 management meeting, the material condition of Turkey Point is improving; however, more progress must be made. Plant material condition will continue to be the focus for intensified monitoring by site management. In particular, as noted in the materials submitted to Region II on April 28, 1989, a comprehensive plan for site material condition upgrades is under development.

### III. Allocation of Resources for Parts and Permanent Staff

#### A. Spare Parts

On April 12, 1989, a team of representatives from the Maintenance, Engineering, Stores, Purchasing, QC and Construction Departments was organized under the direction of the Plant Manager to determine the causes of spare parts availability problems and identify ways to correct them.

The following were identified as reasons for problems with spare parts availability:

- Some often-needed spare parts were not in Stores.
- Items with long procurement lead times were not in Stores.
- Stores contained large numbers of obsolete or unqualified parts.
- Purchase Order processing times was often lengthy.

The team initially met on a daily basis to identify and implement solutions to these problems. It now meets on a bi-weekly basis and working groups still meet on a daily basis. Among the corrective actions taken have been:

- Identifying parts needed for upcoming outages, ordering these parts, and entering them into the Stores inventory list.
- Initiating Purchase Orders for Stores items that are currently below minimum stock levels.
- Instituting a commercial grade dedication program to allow the use of standard-grade parts for some applications (see Section IV).
- Negotiating a blanket Purchase Order with Westinghouse to cut down Purchase Order approval time..
- Accelerated efforts to identify and remove obsolete parts from Stores.



These actions are showing positive results. In particular:

- (i) The number of Stores items below minimum stock levels dropped from 5,154 in May, 1988 to 4,779 as of July, 1989. Approximately 2300 Purchase Orders for items below minimum stock levels are at vendor shops to be filled, which should further reduce this number.
- (ii) The average procurement cycle time for inventory items has been reduced from 111.5 days to 77.8 days (approximately a 25% decrease).
- (iii) The proportion of procurement requests for items that are needed on an "urgent" basis is starting to fall (from a peak of 44% in March, 1989 to 30% in June, 1989) due to the availability of more parts in Stores and the completion of the dual unit outage.
- (iv) Obsolete parts are being deleted from Stores. More obsolete parts (772) were cancelled in the first six months of 1989 than in all of 1988. Four hundred (400) additional cancellations are currently in process for cancellation approval.
- (v) The number of PWO's awaiting parts has dropped from over 300 in December, 1988 to a low of 168 in July, 1989.

Efforts to improve our performance in this area are continuing.

#### B. Permanent Staff

In the area of staffing, the NRC noted an excessive use of contractors in Health Physics and System Engineering, along with high turnover rates in I&C.

Although we will continue to require contractors in these areas during peak work activities and for special projects, FPL has made significant progress in hiring permanent employees. The Health Physics authorized staffing level has been increased from 45 to 88 permanent FPL employees; 68 permanent Health Physics personnel are currently on site, an increase of approximately 25 since December, 1988. Staffing to the authorized level is expected to be complete in December, 1989. A job fair to recruit Radiation Protection Technicians for the Health Physics department will be held in August. Twenty-two candidates have signed up for the job fair so far. Similarly, in the area of Technical Support, as discussed in Section I, progress has been made in hiring System Engineers. The authorized complement of System Engineers was increased to 28 from 16 in March, 1988. Twenty-five of these 28 are now on site; the remaining three have been hired and will arrive in the next three months.

The authorized number of I&C Specialists is set at 65, which is ten greater than actual needs, in order to assure that





sufficient numbers of specialists are available to compensate for turnover. Present actual staffing is at 50 specialists. A job fair planned for August, 1989 should allow sufficient new hires to meet authorized levels. To date, 21 interviewees are scheduled to participate in this job fair. Job fairs of this type were very successful in attracting recruits for Turkey Point Operator training.

Operator training opportunities have accounted for about one half of all departing I&C Specialists. Because the currently filled Operator training class should supply Turkey Point's Operator needs for some time, departures for this reason should decrease. In addition, recent selection of more experienced individuals for I&C supervisory positions (I&C Supervisor, Assistant I&C Supervisor, Production Supervisor, and Planning Supervisor) should improve the working atmosphere within the department. Overtime reduction should also help reduce turnover (see Section IX).

#### IV. Engineering Support

A broad range of actions has been taken to improve engineering support of maintenance. In addition to the steps taken to hire additional System Engineers, the additional System Engineer training and the enhanced role of System Engineers in resolving equipment problems described in Section I, Maintenance, Site Engineering, and Technical Support personnel participate in weekly meetings at which engineering work schedules are reviewed. This allows Maintenance to provide its input to the prioritization process and to maintain cognizance of ongoing engineering activities which may impact maintenance workloads.

Engineering has also provided a dedicated team to help in the work of the Control Room "green tag" backlog. Approximately 50 PCMs have been initiated that should prevent a substantial number of Control Room equipment problems from recurring (44 of these have been issued). Implementation of these PCMs (9 have been implemented) should reduce the "green tag" backlog significantly. Daily discussions between Maintenance and Engineering personnel have been taking place since June, 1988 to develop and plan actions to reduce the number of Control Room "green tags". Engineering is also providing personnel to support procurement activities associated with maintenance efforts to reduce the number of "green tags". The number of control room instruments out of service for both units has declined from 83 in December 1988 to 62 as of June 1989.

Engineering is also playing a substantial role in the efforts to reduce spare parts unavailability problems, which impact the ability of Maintenance to complete work. The group working on parts availability (see Section III) includes representatives from Site Engineering, who participate in daily Procurement Coordination meetings. Additionally, in

March, 1989, Engineering initiated a pilot Commercial Grade Dedication program. Under this program, Engineering prepares "dedication packages" which provide the technical justification for the use of commercial grade replacement parts in particular applications. To date, 5 dedication packages have been issued, primarily for Electrical and I&C items. Use of commercial grade parts makes procurement much simpler and reduces procurement times.

Another area in which Engineering support for Maintenance has improved is in the preparation for plant outages. Plant Change/Modification (PCM) packages to be worked during outages are being prepared further in advance to facilitate outage maintenance planning. For example, 60 days prior to the Turkey Point Unit 4 outage that commenced in the fall of 1988, approximately 35% of the PCMs planned to be worked during the outage had been prepared. To date, 45.8% of the PCM packages identified for the Unit 3 1990 outage have been prepared, and our goal is to have ~~95%~~ prepared 60 days prior to the commencement of the outage.

Finally, Engineering will be performing a Probabilistic Risk Assessment (PRA) for Turkey Point. A contract was awarded to Science Applications International Corporation (SAIC) for this work on June 23, 1989. A detailed schedule of PRA activities is due to be issued in early August, after which we plan to schedule a meeting with the NRC to discuss the PRA.

In sum, Engineering support of maintenance has shown significant improvement, and actions are planned to further enhance Engineering's support role.

#### V. Insufficient Numbers of QC Inspectors

The MTI noted that QC inspectors were accomplishing proper control of quality related activities, but that there were insufficient numbers of QC inspectors and those inspectors have been working excessive amounts of overtime. An analysis has been performed of QC staffing levels and overtime. The approved QC staff for maintenance work inspection was augmented by 3 individuals during portions of the dual unit outage, and approval for additional permanent QC inspectors is now being processed. Also, overtime goals for the QC Department have been set at 16% for 1989. Actual overtime levels declined from 37% in January, 1989 to 10% in June, 1989.



## VI. Work Order Controls and Job Planning

Several improvements have been made to the maintenance planning process. These include:

- Additional training on job planning techniques for job planners. This training was completed April, 1989. A review of the effectiveness of this training is underway.
- Enhancements to the Nuclear Job Planning System (NJPS) which permit the recording of more informative work history data.
- Two Backshift Maintenance coordinators have been hired. One is now on board, the other is due to arrive in August. These coordinators assure that maintenance work is properly coordinated with other site departments (such as Operations, QC, Health Physics, and Security) so that all necessary clearances and personnel are in place to support maintenance work.
- Two Maintenance planners per discipline (a total of 6) have been hired to provide planning support to the backshifts.
- Periodic meetings attended by all department planning supervisors have been held to evaluate and develop measures to improve the maintenance planning process and its implementation. Beginning in March, 1989, these meetings have been used to review sample PWO's for errors, and action has been taken to prevent the recurrence of certain repetitive errors such as inaccuracies in journeymen's work reports.

These improvements should result in a better overall planning process. In addition, the Scheduling and Maintenance Departments will soon begin to track on-time job completion for plan of the day "hot items" as a performance indicator. This indicator will be a measure of whether planning and scheduling was of sufficient quality to permit completion of work without delays.

## VII. Procedure Development

Inadequacies in procedures remain the major cause of maintenance violations, and substantial focus is being placed on improving the quality of maintenance procedures.

1. Check lists used to assure that each new or revised maintenance procedure goes through a proper preparation and review sequence have been reviewed and improved. Procedure writers have received training on the use of these check lists, as well as on general principles of good procedure writing. This training was completed in February, 1989.



2. The process for ensuring that plant changes are factored into procedures has been improved. A departmental instruction has been issued which requires a review of plant changes by both an Operations and a Maintenance procedure writer.
3. An improved process for validating new procedures has been established. Pursuant to this process, procedure writers are present to observe the work the first time a new procedure is utilized. As the work progresses, any problems in implementing the procedure are noted and recorded. Changes to the procedure are then made as necessary to eliminate problems. Procedures formalizing this process were issued on July 20, 1989.
4. Maintenance management is encouraging workers to provide feedback on procedure problems so that inadequate or ambiguous procedures can be corrected. In the electrical discipline, a pilot program has been established under which a team of Maintenance craft personnel, maintenance supervision, and a procedure writer are reviewing and revising "problem" procedures. If successful, consideration will be given to extending this program to the other maintenance disciplines.

#### VIII. Spare Parts Control

Activities to improve spare parts control are described in Sections III and IV above. As noted in Section III, performance indicators in this area are showing significant improvement.

#### IX. Turnover Rates, Overtime Rates, and Performance Appraisals

Maintenance management recognizes the need to reduce turnover and overtime rates for Maintenance personnel. Turnover rates for the various Maintenance disciplines during January through July, 1989 were:

Electrical	8.9%
Mechanical	12.6%
I&C	23%

The rates of turnover in I&C are not satisfactory; however there is reason to believe that this turnover level will move lower. Approximately one-half (7 of 15) of the individuals leaving the I&C Department during the first half of 1989 entered Turkey Point's most recent Operator training class. This class is now full and no new classes are planned for the near future. Thus the single largest cause of turnover has been eliminated in the near term. Also, overtime levels for I&C personnel are declining, from over 40% in January through March, 1989 to less than 30% for the month of June. A target of 26% has been established for 1989. Finally, 10 I&C positions over the actual number needed are authorized, so that staff will be available to mitigate the effects of turnover. Job fairs to be held in August are expected to result in hires to fill these positions.



With respect to overtime, new controls were instituted at the beginning of 1989. These include a requirement for weekly pre-approval of overtime for Maintenance supervision by each responsible supervisor, and tracking and reconciliation of overtime against an overtime budget. Since the end of the dual-unit outage, management has focused significant effort on reducing overtime and Maintenance overtime levels have generally decreased. Electrical discipline overtime went down from over 40% in January through February, 1989 to less than 30% for June, 1989; Mechanical discipline overtime dropped from nearly 50% in January through February, 1989 to less than 20% in June, 1989 (rates in I&C are discussed above). In sum, good progress is being made in reducing Maintenance overtime.

Regarding personnel evaluations, performance appraisals for maintenance management personnel are up-to-date. To assure that performance appraisals are completed in a timely fashion, appraisal completion is being tracked by department so that departments responsible for delinquent appraisals are identified. Although the backlog of delinquent appraisals is still too high, efforts to bring appraisals up-to-date are progressing. In December, the NRC found that 35% of bargaining unit maintenance employees had not had an appraisal in the last six years. As of July 1989, this figure had been reduced to 7.1%. Similarly, the percentage of delinquent two-year appraisals dropped from 81% in December 1988 to 23% in July 1989.

\* \* \* \*

In summary, FPL has taken action to address each of the major areas of weakness noted in the MTI. In nearly all of these areas, FPL has established or will soon have available clear performance measures that will demonstrate whether progress is being made. Although it is clear that more improvement is needed in some areas, many of these indicators are now showing positive trends.