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Document Control Branch (Document Control Desk)

SUBJECT: Forwards response to NRC ltr re violations noted in insp repts 50-250/95-16 & 50-251/95-16.Corrective actions: detailed evaluatio of more than 200 possible CCW sys operating configurations was performed.

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PRIORITY 1 DOCUMENT

FPL

DEC 7 1995

L-95-314
10 CFR 2.201

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Units 3 & 4
Docket Nos. 50-250/251
Reply to Notice of Violation
NRC Inspection Report 95-16

Florida Power & Light Company has reviewed the subject inspection report and, pursuant to 10 CFR 2.201, the required response is attached.

If there are any questions, please contact us.

Very truly yours,

J. H. Goldberg
President
Nuclear Division

JHG/CLM/DCB/db

Attachment

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
T. P. Johnson, Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

IE01

REPLY TO NOTICE OF VIOLATION

RE: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
NRC Inspection Report 95-16

FINDING

10 CFR 50, Appendix B, Criterion XVI, Corrective Action, requires that measures be established to assure that conditions adverse to quality, including deficiencies and defective material and equipment be promptly identified and corrected. Further, in the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude recurrence.

Contrary to the above, the licensee failed to promptly identify and appropriately correct conditions adverse to quality affecting the Unit 3 CCW system. Specifically, operating, emergency, off-normal, and test procedures allowed Unit 3 CCW configurations to exist such that shell side flow CCW flow rate could exceed applicable design limits. The potential for damaging the Unit 3 CCW heat exchangers due to high flow existed, including following accident conditions. Additionally, the CCW heat exchanger design flow rates were exceeded on several occasions, including recently on September 11, 1995, where the 3A CCW heat exchanger limit of 6840 gpm was exceeded during testing. The susceptibility of the Unit 3 CCW heat exchangers to excessive flow was identified by the licensee on September 13, 1995. However, prior opportunities to recognize the vulnerability to high flow were missed, including the 1986 design basis reconstitution efforts, correspondence between the vendors and the licensee addressing the flow limitations, similar issues addressed by a Unit 4 modification (PC/M 88-263) performed in 1990-91, and flow balance and high flow questions raised during the Service Water System Operational Performance Inspection (SWOPI) conducted by the licensee during March - May, 1995.

This is a Severity Level IV violation (Supplement I).

RESPONSE TO FINDING

1. Florida Power & Light Company (FPL) concurs with the finding.

2. Reason for the violation:

Utility personnel failed to ensure that the true design flow limitations of the Unit 3 Component Cooling Water (CCW) heat exchangers were not violated. Design basis reconstitution efforts in 1986 identified an issue concerning minimum CCW flow through the Residual Heat Removal (RHR) heat exchangers, and the potential for pump runout if only one CCW pump was available for post-Loss of Coolant Accident (LOCA) recirculation phase conditions. Investigation of the issue resulted in LER 250/86-009. Flow balance tests were performed in March 1986, for one pump and two pump operation. The tests confirmed that, with the system properly balanced and procedurally controlled, the minimum flow rates to safety-related components were within their design requirements.

In addition, related work associated with CCW heat exchanger performance about the same time as LER 250/86-009 identified a potential concern with high shell side flows through the CCW heat exchangers. Correspondence between FPL, the heat exchanger manufacturer, and Westinghouse documented discrepancies in what were the exact maximum flow limits for the heat exchangers. These high flow limits were identified to the plant by Engineering as values not to be exceeded during plant operations. The limits were placed in the normal plant operating procedures for the CCW system and for specific configurations in the emergency operating procedures. This information, however, was incorrectly viewed by the plant as a limit to be applied during normal plant operation for long term equipment reliability, not as a value that could not be exceeded during an accident or transient. This view was supported by operating experience at higher flows which had not resulted in heat exchanger failures.

The Unit 4 CCW heat exchangers were replaced with new heat exchangers in 1990-91 for reasons related to heat exchanger material condition. As documented in the design change package, the reason for the replacement was due to heat exchanger tube wall thinning and erosion of the tube sheets. These reasons were unique to Unit 4, and resulted primarily from the use of chemical injection in the Unit 4 heat exchangers. The heat exchangers were procured to an 8,000 gpm maximum flow, which was higher than the original design specification to provide additional margin.

A Service Water Operating Performance Inspection (SWOPI) self assessment was performed between March and May of 1995. The issue of potential high CCW heat exchanger flows was identified and addressed. The condition was found acceptable since the heat exchanger tube failure mechanism (tube wear at the tube sheets) would lead to progressive tube failures over time and administrative controls would be appropriate to reduce CCW flows in the long term. These administrative controls are identified

in the CCW system normal operating procedures (3/4-OP-030) and would be used in conjunction with plant emergency procedures. Additional procedural controls were implemented as a result of SWOPI to limit the potential for high flows when placing an RHR heat exchanger in service, which is a relatively frequent occurrence with the potential for high CCW system flows. The SWOPI was a broad based design and operational review of the service water system, and the detailed evaluations to address high CCW heat exchanger flows were not available to the SWOPI team.

The nature of the CCW heat exchanger failure mechanism (tube to tube sheet wear) is such that the exact time to equipment failure cannot clearly be predicted, i.e., catastrophic failure is highly unlikely and the time required at high flow to induce failure can only be estimated. In the past, brief periods of operation above the established design flow limit have not resulted in heat exchanger tube failures. In fact, Eddy Current Testing (ECT) of CCW heat exchanger tubes after operation at flows above the design limit has not shown any evidence of tube degradation. This predisposed FPL to not appropriately address the issue.

As part of the Turkey Point Units 3 and 4 Thermal Power Uprate project, a detailed series of CCW system thermal-hydraulic analyses were performed. In order to appropriately assess the impact of power uprate on both the containment and CCW systems, a detailed flow evaluation of potential system operating configurations was performed. The analyses evaluated both minimum and post-accident maximum CCW system heat removal from the containment. Generally, higher CCW flows and maximum safeguards equipment availability resulted in greater heat removal from the containment and subsequently higher CCW system temperature profiles, which could challenge the CCW system design. This effort identified the nature and extent of the high flow concern and resulted in more detailed flow analysis. More than 200 CCW system flow cases were evaluated, and a detailed system level failure modes and effects analysis was performed in an effort to identify maximum CCW system flows. Once the CCW system operating configurations that could expose the heat exchangers to flows in excess of the design limits were established, the appropriate corrective actions were identified and implemented.

The root causes of the violation were (1) a history in the 1980's of inadequate communications and teamwork between Engineering and the plant organizations, and (2) a predisposition to believe that the original plant analyses, based on minimum safeguards equipment i.e., assuming single active failure, were bounding analyses. The complex engineering analyses to determine the total impact of plant operations and multiple CCW system configurations were not performed until the Thermal Power Uprate project; the result was that the maximum CCW flow limit had been defined, but not adequately translated into proceduralized operating guidance.

3. Corrective steps which have been taken and the results achieved:

   A. Immediate actions to restore operability of the Unit 3 CCW heat exchangers are as follows:

      1. A detailed evaluation of more than 200 possible CCW system operating configurations during normal, off-normal and accident conditions identifying the minimum and maximum flows associated with these configurations, was performed.

      2. Based on the evaluation, plant operating, off-normal, surveillance, and emergency operating procedures were reviewed by a team of Operations and Engineering personnel, and were revised to assure that a high heat exchanger flow condition will not occur.

      3. Modifications to the Unit 3 CCW pump auto-start circuit and the air supply to the emergency containment cooler outlet valves were made to reduce the potential for high CCW flow during normal, off-normal and accident conditions.

4. Corrective actions which will be taken to prevent further violations:

4a. A root cause of this violation was the lack of teamwork between the plant and engineering organizations. Changes have been made to the FPL plant and engineering organizations and interaction since that time, including placement of the engineering manager on site and the reduction in reliance by FPL on outside contractors. Additionally, improved communications between engineering and operations, and the documentation and tracking of potential concerns such as those discussed herein, have been effected via the Condition Report system.

The present Condition Report system is administered via procedure 0-ADM-518, "Condition Reports," and requires that all Condition Reports be reviewed at their inception by the Nuclear Plant Supervisor and the Plant General Manager. Engineering output documents are controlled by Engineering Quality Instructions (ENG-QIs). Engineering responses to Condition Reports (CRs) are controlled by ENG-QI 2.5, Condition Reports, and require interdepartmental review of the output document. All completed CRs are reviewed by a Shift Technical Advisor, the Technical Department Manager, and the Plant General Manager, as a minimum. Any outstanding actions require concurrence by the implementing manager, and are tracked via the Plant Manager Action Item (PMAI) tracking system.

4b. At the time the high CCW heat exchanger shell side flow issue was identified (1986), the engineering information related to flow restrictions was transmitted to the plant in the form of a safety assessment for incorporation into plant procedures. Greater controls have since been placed on the transmittal of design information to the plant, such that Engineering would perform a formal 10 CFR 50.59 evaluation for review and approval by the plant, which is a strictly controlled process.

* Engineering transmits technical information via output documents, such as engineering evaluations, safety evaluations, operability evaluations, engineering packages, etc. All of these controlled output documents receive formal review and concurrence.

* ENG-QI 2.0, "Engineering Evaluations," Section 5.6, specifically covers information provided by vendors, and now states that, "Engineering evaluations for the conditions above would also require a 10CFR50.59 evaluation if temporary designs, compensatory actions, or procedure changes are involved (See ENG QI 2.1)."

* ENG-QI 2.1, "10CFR50.59 Screening/Evaluation," Section 5.3, now requires that, "the 10CFR50.59 evaluation shall...

  o Specify any required restrictions placed on implementation or operation."

* Plant administrative procedure 0-ADM-507, "Processing Safety Evaluations," Section 5.7, requires that, "The completion of all compensatory measures or other corrective actions required as a result of the safety evaluation shall be tracked via the PMAI tracking system."

5. The date when full compliance was or will be achieved:

Full compliance was achieved on October 3, 1995 when revised plant procedures were approved and implemented and associated modifications were completed on Unit 3.