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ACCESSION NBR:9004050447 DOC.DATE: 90/03/28 NOTARIZED: NO DOCKET #
FACIL:50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
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SUBJECT: Responds to violations noted in Insp Repts 50-250/89-203 & 50-251/89-203.

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P.O. Box 14000, Juno Beach, FL 33408-0420

MARCH 28 1990

L-90-105
10 CFR 2.201

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

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Reply to Notice of Violation
Inspection Report 89-203

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

Very truly yours,

J. H. Goldberg
Executive Vice President
Nuclear Energy

JHG/GRM/sh

Attachment

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

IE01
1/1

Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Reply to Notice of Violation
Inspection Report 89-203

FINDING 1:

10 CFR 50, Appendix B, Criterion V, Instructions, Procedures and Drawings, requires that activities affecting quality shall be prescribed by appropriate procedures and shall be accomplished in accordance with those procedures.

Contrary to the above, the following procedural errors were identified:

a. Procedure 4-OP-30 step 7.5.2.7 failed to direct that valve 4-737C be opened to achieve makeup flow.

b. Procedures 3 and 4-OP-30 step 7.6.2.15 erroneously specified valve 4-711B be left open and step 7.6.2.5 specified in error that valves 3-711A and 4-711A be left open. The proper valve lineups were determined to be the closed position.

c. Procedure 3-OP-30, Attachment 2 and 3 specified that valves 3-10-681, 3-10-682, and 3-10-683 were normally open when the valves should be normally closed.

d. Procedures 3 and 4-OP-30, Attachments 2 and 3 failed to include valves 3-10-749, 4-10-692, 4-10-1009, 4-10-1010, 4-1181, 4-1182, and 4-769D that were depicted on drawing 5610-T-E-4512.

e. Procedure 3 and 4 ONOP-30 step 5.6.3 could not be implemented as a set of hoses had not been provided for Unit 4 and the hoses provided in Unit 3 were of insufficient length to be coupled in the required configurations.

For items a through d, the errors in valve lineup lists could have placed the system in a condition where a loss of system inventory could occur due to mispositioned valves. For item e, emergency equipment to accomplish actions based upon a loss of component cooling water was not properly staged in the plant.

RESPONSE TO FINDING 1:

The procedural errors in valve line-up lists identified in examples a through d were due, in part, to personnel error. These errors occurred over the last several years by various individuals. For this reason, identified corrective actions related to personnel errors have been administered on a generic level.

Example a and b:

1. FPL concurs with the findings.

2. The failure to direct that valve 4-737C be opened to achieve makeup flow and that valves 3-711A, 4-711A and 4-711B be left in the closed position were due to personnel error. The individual responsible for changing Operations Procedure 4-OP-030, "Component Cooling Water System," used the Unit 3 portion of Drawing 5610-T-E-4512 instead of Detail 1, which contained the Unit 4 valve configuration, to specify Unit 4 valve positions. Subsequent reviews of the procedure change by other departments did not identify the valve position errors.

   The correct position for valve 3-737C is normally open, whereas, the correct position for valve 4-737C, the Unit 4 counterpart, is normally closed. The correct position for valve 3-711B is normally open, whereas valve 4-711A, the Unit 4 counterpart, is normally closed. Additionally, the valve position differences between the same system configuration for Unit 3 and Unit 4 led to Operations Procedures 3/4-OP-030 being changed to specify valves 3-711A and 4-711B as being normally open instead of normally closed.

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

   Operations Procedures 3/4-OP-030 were revised to specify the correct valve positions for valves 4-737C, 3-711A, 4-711A and 4-711B.

4. Corrective steps which have or will be taken to avoid further violations include:

   a. A memorandum was issued to Procedure Upgrade Program (PUP) personnel addressing the need to pay attention to detail when making or reviewing procedure changes to ensure that valves and breakers are properly aligned.

   b. Procedure change review checklists will be developed for use by the Operations Department and the Operations Support Group. Upon implementation, these checklists will enhance the procedure change review process by verifying that valves and breakers are properly aligned.

5. The date when full compliance was achieved:

   a. Item 3: Operations Procedure 3-OP-030 was revised on September 21, 1989: Operations Procedure 4-OP-030 was revised on September 21, 1989 and on October 10, 1989.

b. Item 4.a was completed on March 13, 1990.

c. Item 4.b will be completed June 15, 1990.

Example c:

1. FPL concurs with the finding.

2. Valves 3-10-681, 3-10-682, and 3-10-683 were specified to be normally open in Attachment 2, "Component Cooling Water Inside Containment Valve Alignment," of Operations Procedure 3-OP-030 instead of normally closed due to personnel error. The correct valve positions were reflected in the marked-up procedure that was submitted to and approved by the Plant Nuclear Safety Committee (PNSC). The individual responsible for word processing the PNSC approved procedure inadvertently typed the wrong valve position for the subject valves. The procedure change originator failed to identify the typographical errors while proof reading the word processed procedure.

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

   Operations Procedure 3-OP-030 was revised to reflect the correct normal position for valves 3-10-681, 3-10-682, and 3-10-683.

4. Corrective steps which have been taken to avoid further violations include:

   A checklist was developed for PUP personnel that provides guidance for proof reading procedure changes. Training was conducted on this checklist.

5. The date when full compliance was achieved:

   a. Item 3 was completed on September 14, 1989.

   b. Item 4 was completed on February 21, 1990.

Example d:

1. FPL concurs with the finding.

2. a. Valves 4-10-692, 4-10-1009, 4-10-1010, 4-1181, and 4-1182 were added to Drawing 5610-T-E-4512 in accordance with the Drawing Update Process (DUP). This process did not require that drawing changes be reviewed by either PUP personnel or plant operations personnel for impact on plant procedures.

b. Valve 3-10-749 was not added to Operations Procedure 3-OP-030 due to personnel error. A change was initiated against Operations Procedure 3-OP-030 resulting from the review of Plant Change/Modification (PCM) 88-453, however, the subject valve was not included. The valve was added to related Operations Surveillance Procedure 3-OSP-051.12, "Refueling Containment Penetration Alignment". Additionally, the individual originating the change to Operations Procedure 3-OP-030 failed to follow Administrative Procedure AP 0109.1, "Preparation, Revision, Approval, and Use of Procedures", which requires that System Engineering review procedure changes involving the implementation of a PC/M.

c. Valve 4-10-769D was not added to Operations Procedure 4-OP-030 due to personnel error. The package for PC/M 88-078 identified Operations Procedure 4-OP-030 as requiring revision but did not contain a marked-up copy of Drawing 5610-T-E-4512. Review of an incomplete PC/M package resulted in the failure to include valve 4-10-769D in Operations Procedure 4-OP-030.

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

a. Operations Procedure 4-OP-030 was revised to include valves 4-10-1009, 4-10-1010, 4-1181, 4-1182, 4-769D, and 4-10-692.

b. Operations Procedure 3-OP-030 was revised to include valve 3-10-749.

4. Corrective steps which have or will be taken to avoid further violations include:

a. The DUP has been discontinued. The PC/M process is currently the method by which drawings are changed. Quality Instruction QI-3-PTN-1, "Design Control", requires PUP personnel and plant operations personnel to review PC/Ms for impact on plant procedures prior to PC/M closure.

b. The Request For Procedure Review Form (Form 5714A) was revised to add a System Engineering sign-off for the review of routine procedure changes.

c. A memorandum was issued to PUP personnel to address the need to verify all affected drawings are included in the PC/M package when reviewing PC/Ms.

d. Technical Department Instruction TDI-001, "PC/M Review Process", will be revised to require that PC/M packages

are verified to be the correct revision and contain the necessary drawings.

e. A design verification of procedures for selected systems has been performed. The procedures were verified against applicable T-E drawings. Noted discrepancies had been previously identified and were being tracked under either the Nonconformance Report (NCR) process or the PC/M program.

5. The date when full compliance will be achieved:

a. Item 3.a, Operations Procedure 4-OP-030, was revised on September 21, 1989 and on October 10, 1989.

b. Item 3.b was completed on September 21, 1989.

c. Item 4.a was completed on December 12, 1989.

d. Item 4.b was completed on August 22, 1989.

e. Item 4.c. was completed on March 13, 1990.

f. Item 4.d will be completed on June 15, 1990.

g. Item 4.e was completed on December 18, 1989.

Example e:

1. FPL concurs with the finding.

2. Due to the lack of administrative controls, hoses installed to supply emergency cooling water to the 4B Charging Pump were removed from the Unit 4 Charging Pump Room by plant personnel. No controls existed to periodically verify that the hoses remained in place. Additionally, when hose lengths were prepared for the 3B Charging Pump, no consideration was given to supplying emergency cooling water to the 3C Charging Pump.

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

Hoses of proper length and with correct fittings were staged in the Unit 3 and 4 Charging Pump Rooms.

4. Corrective steps which have been taken to avoid further violations include:

Operations Surveillance Procedures 3/4-OSP-300.2, "Pre-Staging Equipment and Alternate Shutdown Panel 3C264 (4C264) Switch and Instrumentation Alignment Check", were revised to require monthly verification that the hoses and other

equipment, required to be staged to support off-normal operations, are in place.

5. The date when full compliance was achieved:

   a. Item 3 was completed on January 13, 1990.

   b. Item 4, Operations Surveillance Procedure 3-OSP-300.2 was revised on January 17, 1990 and Operations Surveillance Procedure 4-OSP-300.2 was revised on January 16, 1990.

FINDING 2:

10CFR50, Appendix B, Criterion XVIII, Audits, states that comprehensive audits shall be performed to verify proper implementation of all aspects of the quality assurance program.

Contrary to the above, the following calculational errors were identified within various design documents with respect to the guiding design requirements which had not been detected due to the less than adequate scope or depth of the licensee technical audit overview of the design control program.

a. Bechtel Specification 5177-M900, Qualification of Seismic Category 1 Equipment, states that the flexibility of supports shall be considered for the seismic analysis of equipment. Contrary to the specification requirements, Bechtel calculation C-SJ-183-02 did not account for the transverse flexibility of the component cooling water heat exchanger support pedestals. This resulted in the erroneous qualification of the heat exchanger with decreased seismic loads.

b. Teledyne technical report TR-5322-1, Project Procedures and Criteria/USNRC I&E Bulletin 79-14 Analysis/Turkey Point, requires that safety-related piping be qualified to the appropriate loading combinations and stress limits. Contrary to the technical report requirements, Teledyne calculation 6548-1 failed to account for the effects of valve thrust, did not address the need for a tie back support for the branch line associated with valve RV-3-1431, and did not perform a stress check at the root of the branch lines for the combined effects of pressure, deadload, valve thrust, and seismic loads.

c. Teledyne technical report TR-5322-1, Project Procedures and Criteria/USNRC I&E Bulletin 79-14 Analysis/Turkey Point, defined the pipe support calculational methodology. Contrary to the technical report requirements, the anchor bolt tension and shear loads for support SR-703 were not computed correctly as the edge distance amplification factor was not used and the shear loads were distributed to all rather than half of the anchor bolt. Additionally, the tension for support 4-ACH-211 exceeded the allowable bolt tension of the technical report and pipe support 4-ACH-267 was qualified to resist uplift loads which was not addressed by the technical report.

RESPONSE TO FINDING 2:

1. FPL concurs with the finding.

2. The reasons for the findings are described below:

Example a:

The Bechtel calculation C-SJ-183-02, Component Cooling Water (CCW) Heat Exchanger Support Pedestal Load Evaluation, included an evaluation of the heat exchanger fundamental frequency. The Bechtel calculation assumed a fundamental frequency greater than 33 Hz for the heat exchangers and concluded that the heat exchangers were rigid. The calculation, therefore, used the Zero Period Acceleration (ZPA) values of the SSE spectrum to compute the seismic reactions of the heat exchangers. However, the Bechtel calculation did not consider the transverse flexibility of the concrete pedestals supporting the heat exchangers. When the heat exchanger and the supporting concrete pedestals were analyzed as a single mathematical model, the fundamental frequency of the heat exchanger was shown to be well below the rigid range along its longitudinal axis. This would change the magnitudes of the seismic loads for which the heat exchangers must be qualified. This deficiency was the result of personnel error. The calculation failed to substantiate the assumption that the pedestals were rigid.

Example b:

FPL engineering package PC/M 86-238 was written for replacement of Unit 4 relief valves RV-1423 through 1431. Teledyne prepared calculation 6548-1 to qualify these 1½ inch and 1 inch diameter cantilever branch lines for both units. Teledyne Technical Report TR-5322-1 requires that safety-related piping be qualified to the appropriate loading combinations and stress limits. However, the Teledyne calculation does not address:

- o the effects of valve thrust
- o the need to support valve RV-3-1431 with a tieback from the 3-inch run pipe, since the branch line is not rigid;
- o A stress check at the root of each branch line for the combined effects of pressure, dead load, valve thrust, and seismic loads; or
- o The effects of lumped mass of the branch line and relief valve. If this lumped mass is considered, the fundamental frequency of the branch line will drop.

The above deficiencies were the result of this relief valve replacement being considered a "like for like" replacement. Justification for the replacement relief valves was based on the acceptability of the existing configuration which was

installed to meet the applicable design requirements and the assumption of design equivalence. This led to incomplete documentation in support of the replacement and the subsequent divergence from Teledyne stress analysis procedural compliance.

Example c:

The NRC Inspection Team compared the Teledyne calculations against the applicable Teledyne engineering procedures and identified the following calculational and procedural deficiencies:

- Teledyne re-qualified a number of stanchion supports to resist uplift. However, the Teledyne baseplate procedure does not appear applicable to the qualification of these supports. Pipe support 5-ACH-267 is an example of such a stanchion support.

- Some anchor bolt tension and shear loads, such as for support SR-703, were not computed in accordance with the Teledyne procedure. For example, baseplate edge distance amplification factors were not applied to compute bolt tension loads, and the shear loads were distributed to all, rather than half, of the anchor bolts.

- The allowable bolt tension used to qualify pipe support 4-ACH-211 exceeded the bolt tension allowed by the Teledyne design guide.

- Bending stresses in single-angle supplementary steel were not correctly computed. Examples included the supplementary steel for pipe supports 4-ACH-14 and 4-ACH-46.

- Some supplementary steel was checked using assumed cross-section dimensions that were not field verified. Examples included the supplementary steel for pipe supports 4-ACH-190 and 4-ACH-191.

- Spring hanger 4-ACH-207 tops and bottoms out, but was accepted as-is without analysis.

- The Teledyne stress packages indicated that ZPA and seismic inertia loads should be combined absolutely; however, these values were actually calculated by the SRSS method within the stress package.

- The AISC web crippling check was not performed to determine if beam stiffeners are required.

The deficiency related to uplift of stanchion supports was caused by inadequacies in the Teledyne base plate procedure. Although the technical provisions of the procedure are applicable to the support in question, the configuration is not represented in the procedure.

The deficiency related to the combination of ZPA and seismic inertia loads resulted from a lack of clarity in the calculation concerning the use of Teledyne's computer program. As discussed in Section (3), the computer program did not have the capability of combining ZPA and seismic inertia loads using the required SRSS method; therefore, Teledyne performs this combination by hand.

The remaining deficiencies were the result of personnel error in the areas of procedural compliance and analytical/design processes.

In summary, the three examples discussed in Sections 1 and 2 of this response were generally the result of ambiguous procedures, personnel error, and insufficient training. Insufficient oversight of the engineering contractors by FPL has also contributed to the noted deficiencies.

3. Corrective steps which have been or will be taken and results achieved include:

Example a:

The determination that the heat exchanger pedestal supports are flexible (approximately 5 Hz) along the longitudinal axis affects the qualification of the CCW and Intake Cooling Water (ICW) piping attached to the heat exchangers, the heat exchangers, and the support pedestals themselves. The analyses for each of these components have been revised/reviewed as described below:

The piping stress analyses for both the CCW and ICW piping have been revised, taking into account the pedestal flexibility. The revised analyses showed that both systems, including the pipe supports, remain within Updated Final Safety Analysis Report allowable stresses. New heat exchanger nozzle loads were also determined from these analyses.

The heat exchanger qualification is being reviewed in order to determine the effect of the new nozzle loads and the pedestal flexibility. With respect to nozzle loadings, no adverse effect on heat exchanger qualification is anticipated. A preliminary comparison of the new nozzle loads against the allowable stresses documented in the original heat exchanger qualification report has indicated that the increase in nozzle loads falls within the margin between actual and allowable

nozzle stresses. Upon further review of the seismic input provided in the specification to the heat exchanger vendor, it was found that the response spectra used was a conservatively amplified enveloping response spectra curve. The ZPA for the enveloping spectra provided in the specification is greater than the acceleration corresponding to 5 Hz on the ground response spectra which actually corresponds to the base of the support pedestals (0.4 g's versus 0.37 g's respectively). Accordingly, the seismic loading on the heat exchangers will be reduced, even when the pedestal flexibility is considered. FPL is working with Target Technologies to obtain a revised final stress report by June 30, 1990. This report will include a consideration of the effects of the correct pedestal flexibility, the new nozzle loads, and the ground response spectra which correspond to the heat exchanger location. This report will be incorporated into the heat exchanger replacement engineering documentation package within 60 days of receipt, but no later than August 29, 1990.

Example b:

The calculation which supported the replacement of CCW relief valves (RV-1423 through 1431), installed per PC/M 86-238, was revised to include the following:

- o The effects of valve thrust
- o A stress check at the root of each branch line
- o The effects of lumped mass of the branch line and relief valve

During the determination for the need to support RV-3-1431, the hand calculation for the branch line containing RV-3-1431 was revised using a dynamic analysis and it was determined that the branch line actually has a frequency greater than 33 Hz. As a result, there was no need to support the valve with a tieback from the 3-inch run.

This review determined that the existing configuration for the relief valves continues to meet the Turkey Point UFSAR stress criteria, Appendix 5A. These reviews are documented in the Teledyne calculation.

Example c:

(1) Teledyne reviewed pipe support 4-ACH-267 for uplift and determined that based on the thickness of the plate, the prying factor is 1.0; while examples in the Teledyne baseplate procedure do not represent the actual support configuration, the procedure is still applicable.

(2) Teledyne reviewed SR-703 and determined that the baseplate edge distance amplification factor was 1.0 based on the plate thickness. The calculation originally considered shear loading on all four anchor bolts. Upon further review, an arithmetic error was identified in the shear load calculation. The calculation was revised to distribute the shear load to half of the anchor bolts.

(3) Teledyne reviewed support 4-ACH-211 and determined that the calculation referenced an incorrect revision to the Teledyne design guide. The allowable bolt tension to qualify the support was bounded by the bolt tension in the later revision of the design guide.

(4) Teledyne revised calculations for supports 4-ACH-14 and 4-ACH-46 to correctly compute bending stresses in single angle supplementary steel.

(5) Supports 4-ACH-190 and 4-ACH-191 are currently on the punchlist for discrepancies identified during the development of their respective drawings. Therefore, these supports will be walked down to verify the dimensional assumption in the calculation.

(6) Teledyne revised the calculation for spring hanger 4-ACH-207, including the stiffness of the spring hanger in the dynamic analysis to limit seismic travel and as a result, the support did not top or bottom out.

(7) The ZPA loads are those which result from the response of the piping system in the rigid range. These loads are combined with the seismic inertia loads which result from the piping stress analysis. The ZPA and seismic inertia loads are correctly combined using the SRSS method in the calculation. However, the computer code used to support the Teledyne stress packages does not presently have the capability of combining the ZPA and seismic inertia loads using the SRSS method; it combines them absolutely. Therefore, Teledyne currently performs the SRSS combination of the ZPA and seismic inertial loads by hand. Teledyne's computer program will be modified to perform this function.

(8) Teledyne revised the affected stress packages to address the AISC web crippling check.

For all the identified deficiencies, with the exception of corrective action (5) above, the revised calculations resulted in confirming that the existing configuration continues to meet the Turkey Point UFSAR stress criteria, Appendix 5A. This is documented in Teledyne calculations.
For corrective action (5) above, the assumed configuration

meets UFSAR stress criteria (as documented in Teledyne calculations). Upon completion of walkdowns, calculations will be revised as necessary. This will be completed no later than August 29, 1990.

4. Corrective steps that have been or will be taken to avoid further violations include:

   a. FPL's major engineering contractors (Bechtel, Ebasco and Teledyne) have taken the following actions to enhance their calculation programs:

      1. Procedures controlling calculations and/or aiding the engineer performing the calculations have been upgraded.

      2. Training has been provided on these procedure upgrades to the appropriate engineers within each engineering contractor.
      3. The importance of procedural compliance, and attention to detail has been disseminated via training and internal memoranda.

      In the future, it is expected that further procedure enhancements and training will be forthcoming as a result of continued engineering contractor effort in this area and FPL Nuclear Engineering management audits.

   b. To assure ongoing improvement, FPL has implemented a program of technical assessment of the architect/engineers. These assessments are performed primarily by FPL Nuclear Engineering discipline managers.

   c. The architect/engineers performing work are periodically graded on the technical quality of their work. Calculational deficiencies are a significant input to this grade.

   d. QA audits of the major architect/engineer organizations have increased in frequency. Nuclear Engineering is supporting these audits with senior engineering personnel.

5. The date when full compliance will be achieved:

   The corrective actions of **Item 3 Example a** and **Item 3 Example c (Corrective Action (5))** will be complete by August 29, 1990.

   All other corrective actions of Items 3 and 4 are complete.

   FPL will be in full compliance by August 29, 1990.