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AUTH.NAME AUTHOR AFFILIATION
HARRIS,K.N. Florida Power & Light Co.
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SUBJECT: Responds to NRC ltr re violations noted in Insp Repts 50-250/89-203 & 50-251/89-203.

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JAN 29 1990

L-90-36

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 Inspection Report 89-203

Florida Power & Light Company has reviewed the subject inspection report. The response to the unresolved items identified in the report is attached.

Should you need any additional information, we would be glad to discuss the response with you.

Very truly yours,

K.N. Harris
Vice President
Turkey Point Plant

KNH/GRM/tbj

Attachment

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

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

DEFICIENCY 89-203-10: REPLACEMENT CCW HEAT EXCHANGER SHELL-SIDE NOZZLE LOAD

Discussion: FP&L engineering package PC/M 88-263 was written for replacement of the Unit 4 heat exchangers. FP&L prepared purchase order C88658 90314 to procure the replacement heat exchangers. Appendix C of the purchase order required that the replacement heat exchangers be qualified by the response spectrum approach for the SSE depicted in Figure 1 of that Appendix.

The Bechtel calculation C-SJ-183-02 CCW Heat Exchanger Support Pedestal Load Evaluation, included an evaluation of the heat exchanger fundamental frequency. The Bechtel calculation computed 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. If the heat exchanger and the supporting concrete pedestals were analyzed as a single mathematical model, the fundamental frequency of the heat exchanger along its longitudinal axis drops to about 10 Hz. This would increase the magnitudes of the seismic loads for which the heat exchangers must be qualified.

The replacement heat exchangers were qualified for piping thrust, dead loads and seismic loads by Target Technology Ltd. Bechtel recommended that Target compute the heat exchangers fundamental frequency and use ZPA loads both to qualify the heat exchangers and to compute the heat exchanger support reaction. Like Bechtel, Target computed the heat exchanger fundamental frequency without considering the transverse flexibility of the concrete pedestals and concluded that the heat exchanger was rigid.

As a consequence, Target qualified the replacement heat exchanger with respect to the ZPA seismic loads. Since the heat exchangers and concrete pedestal configuration is flexible, the Target stress report does not adequately qualify the replacement heat exchangers for the governing seismic loads.

This item is Unresolved (89-203-10)

FPL Response:

The determination that the heat exchanger pedestal supports are flexible (approximately 5 Hz)[1] in the longitudinal axis affects the qualification of the CCW and 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[2][3]. The revised analyses showed that both systems, including the pipe supports, remain within Updated Final 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[4], it was found that the response spectra used was a conservatively amplified enveloping response spectra curve. The Zero Period Acceleration (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)[5]. 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.

This item will be considered complete once the report has been incorporated into the documentation package as discussed above.

References:

1) Bechtel Calculation 18712-183-C-SJ-183-02 Revision 8, "CCW Heat Exchanger Support Pedestal Load Evaluation"
2) Teledyne Calculations 6961C-1 Revision 4, "Stress Problem 025" and 6961C-3 Revision 6, "Stress Problem 038/CCW-24"
3) Bechtel Calculations 18712-M12-183-02 Revision 5, and 18712-M12-183-04 Revision 2, "ICW Piping Stress Analysis"
4) Purchase Order No. C88658-90314 for CCW Heat Exchanger Replacement
5) Bechtel Calculation 18712-183-C-SJ-183-12 Revision 1, "CCW Heat Exchanger Pedestal Stiffness Analysis"

DEFICIENCY 89-203-13: REPLACEMENT CCW HEAT EXCHANGER SHELL-SIDE NOZZLE LOAD

Discussion: FPL engineering package PC/M 88-263, was written for replacement of the Unit 4 heat exchangers. The heat exchangers were qualified for the imposed dead loads, nozzle loads, and seismic loads in a Target Technology report.

Bechtel calculation M12-183-01 tabulated shell-side nozzle loads that were substantially higher than the nozzle loads which Bechtel originally transmitted to Target and which were used in the Target qualification report. Bechtel transmitted the revised nozzle loads to Target on November 23, 1988. Bechtel and Target discussed these nozzle loads on December 1, 1988 and Target informed Bechtel that the increased nozzle loads were acceptable.

However, Target never revised and reissued the CCW heat exchanger qualification report to document the qualification of the heat exchangers for the revised nozzle loads.

This item is unresolved (89-203-13).

FPL Response:

Subsequent to this increase in nozzle loads, the piping stress analyses for the CCW and ICW piping have been revised. New heat exchanger nozzle loads were determined from these analyses.

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 newly revised nozzle loads.

Since the stress report is being resubmitted to address revised nozzle loads, and is being tracked as part of Deficiency 89-203-10, this item is considered complete.

DEFICIENCY 89-203-14: CCW RELIEF VALVE REPLACEMENT

Discussion: 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 1-1/2 inch or 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.

This item is Unresolved Item (89-203-14).

FPL Response:

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:

The effects of valve thrust

A stress check at the root of each branch line

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 and 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[1].

This item is considered complete.

Reference

1) Teledyne calculation 6548-1, Revision 1, associated with PC/M 86-238.

DEFICIENCY 89-203-15: COMPONENT COOLING WATER OPERATING PROCEDURES

Discussion: The inspection team reviewed operating procedure 3/4-OP-030 for the CCW system to determine if valve lineups were consistent with approved design drawings and if lineup changes for various operating evolutions were properly established and restored. The team found the following deficiencies when comparing the procedures to system drawings 5610-T-E-4512, Sheet 1 and 2:

- Procedure 4-OP-030, page 25, Step 7.5.2.7, directs the operator to makeup the CCW surge tank as required by manipulating valves MOV-4-832, 4-711B and 4-710B. Valve 4-737C was not referenced as requiring manipulation; however, it is shown as a normally closed valve on the system drawing and would inhibit makeup flow if not opened.

- Procedures 3-OP-030 and 4-OP-030, page 27, step 7.3.2.15 specify that valve 4-711B be left open although drawing 5610-T-E-4512 indicates normal position as closed. Step 7.6.2.15 specifies the positions of valves 3-711A and 4-711A as being left open although the referenced drawing indicates closed as the normal position.

- Procedures 3-OP-030 and 4-OP-030, Attachments 2 and 3, for CCW valve alignment inside and outside containment, contained the following deficiencies:

  - Valves 3-10-681, 3-10-682, and 3-10-683 were specified as having a normal position of open in the valve lineup as opposed to closed as indicated on they system drawing.

  - Valve 4-10-689 was specified as being closed in the valve lineup as opposed to closed and capped as indicated on the system drawing.

  - Valves 3-10-749, 4-10-692, 4-10-1009, 4-10-1010, 4-1181, 4-1182, and 4-769D were shown on the system drawings but were not included in the valve lineup.

These deficiencies if not corrected, could have resulted in failure to adequately verify system integrity or could have placed the system in a condition where valves were left opened instead of closed, resulting in a loss of system integrity. With the exception of the makeup valves (4-737C, 4-711B, 3-711A, and 4-711A) the valves noted were vent and drain valves.

The licensee agreed to make the identified corrections to the procedures.

The item is unresolved (89-203-15).

FPL Response:

Procedure Corrections have been completed as follows:

- Procedure 4-OP-030 Infrequent Operations Section 7.0, has been modified to indicate valve 4-737C requires manipulation for alternate CCW surge tank fill.

- Procedures 3-OP-030 and 4-OP-030, Infrequent Operations Section 7.0, has been modified to indicate valve 4-711B as closed in step 7.5.2.15 and valves 3-711A and 4-711A as closed in step 7.6.2.15.

- Procedures 3-OP-030 and 4-OP-030 valve lineups have been modified to show:

  - Valves 3-10-681, 3-10-682, and 3-10-683 as closed. Additionally, investigation of the improper valve positions listed in 3-OP-030 for valves 3-10-681, 3-10-682, and 3-10-683 showed incorrect positions resulted from a procedure change error and that a valve lineup had not been performed using this procedure with these incorrect positions listed. We are confident that had a valve lineup been performed, the "On-The-Spot-Change" process would have been used to correct this procedural error.

  - Valve 4-10-689 was closed and capped.

  - Valves 3-10-749, 4-10-692, 4-10-1009, 4-10-1010, 4-1181, 4-1182, and 4-769D as shown on system drawing 5610-T-E-4512

An additional concern raised by the resident inspector involves 3/4-ONOP-030, Loss of Component Cooling Water. The area of concern involved emergency hoses and included:

1) Physical Fit-up of hoses (fittings)

2) Hose Length (to allow reaching all three pumps)

3) Designated storage

FPL RESPONSE

Item 1 - Physical Fit-up has been verified and is complete.

Item 2 - Hose length has been verified and the length allows reaching all three pumps.

Item 3 - Permanently designated storage is presently being investigated by the Operations Department.

DEFICIENCY 89-203-16: CCW PUMP AND SURGE TANK SEISMIC QUALIFICATION AND ANCHORAGE CHECK

Discussion: Westinghouse Equipment Specification 676428 included the seismic qualification criteria for the CCW pumps. Section 3.2.12 of the specification stated that the pumps shall be designed to resist earthquake forces in the horizontal and vertical directions, as specified by the data sheets. The Westinghouse centrifugal pump data sheet APCC-532 specified a horizontal design acceleration of 1.0 g and a vertical design acceleration of 0.67 g. FPL could not access the seismic qualification documents for the CCW pumps. FPL additionally could not access any seismic criteria for the CCW surge tank, or any seismic qualification documents.

The equipment anchorage should be checked for the combined effects of piping thrusts, dead load and seismic load. However, FPL could not access the anchorage calculations for the CCW pumps and surge tanks.

The audit team was informed that an essential calculation program is planned for the facility. The licensee will determine which calculations are required and will verify that the calculations are retrievable.

This item is unresolved item (89-203-16).

FPL Response:

As indicated in the above discussion, no seismic qualification documents have been found for either the CCW pump or the CCW surge tank. This situation is not uncommon for power plants of Turkey Point's vintage. In order to assess the need to recreate the qualification documents for this type of equipment, FPL commissioned a review of the Turkey Point seismic design. This review was conducted by Westinghouse and completed in July 1989.

The Westinghouse report[1] compared the seismic capacities of equipment documented in various NUREGs and other published literature to similar, if not identical, equipment found at Turkey Point. This report concluded that the Turkey Point safety related equipment, including the CCW pumps and surge tanks, have high generic seismic capacities. If properly anchored, the equipment is seismically adequate due to Turkey Point's location in a low seismicity region.

In addition to the Westinghouse effort discussed above, the issue of equipment seismic qualification is being addressed under Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46". FPL has submitted a program to the NRC for resolution of this generic issue.

An analysis of the CCW pump anchorage has been performed to evaluate the effects of nozzle loads, dead loads, and seismic loads[2]. This analysis showed that the pump anchorage is satisfactory to withstand all postulated loads.

Similarly, analyses of the CCW surge tank anchorages (including structural steel supporting members) have been performed to evaluate the effects of nozzle loads, dead loads, and seismic loads[3]. The structural members and connections have been shown in this calculation to adequately withstand all postulated loads and to remain within UFSAR allowable stresses. The expansion anchors used to attach the supporting members to the concrete walls have been shown to be acceptable for functionality; however for Unit 4, modifications will be required to bring the safety factors up to the values required by current standards.

The anchor modification discussed above will be implemented by the end of the next Unit 4 refueling outage, currently scheduled to start in November 1990.

FPL is proceeding with developing an enhanced Calculation Control Program. This program includes a revised calculation procedure and a FPL mainframe computer indexing system that will accept FPL and contractor calculations. The revised calculation procedure was issued in December 1989. The loading of the new calculation index data will be a continuing process and the loading of the historical data will be handled through the normal budget process.

References:

1) "Turkey Point Units 3 & 4, Fragility Analysis for Quantification of Seismic Capabilities of Buildings, Structures and Equipment, WCAP-12051", Westinghouse Electric Corporation, July 1989
2) Bechtel Calculation 18712-183-C-SJ183-11 Revision 1, "CCW Pump Pedestal Analysis"
3) Bechtel Calculation 18712-183-C-SJ183-10 Revision 1, "CCW Surge Tank Platform Analysis"

DEFICIENCY 89-203-18: CCW PIPE SUPPORT CALCULATIONS

Discussion: The team reviewed the calculations for approximately twenty four pipe supports which were documented in the following Teledyne stress packages:

- Teledyne calculation TR-5322-93, USNRC I&E Bulletin 79-14 Analysis, Turkey Point Unit 4 Nuclear Power Plant, Component Cooling Water System (Outside Containment)/Stress Problem CCW-14, Revision 1, dated November 21, 1984;

- Teledyne calculation 6961C-1, Analysis of Stress Problem 025 Unit 4, Turkey Point, for Replacement of CCW Heat Exchangers, Revision 3, dated November 30, 1988; and

- Teledyne calculation 6961C-3, Analysis of Stress Problem 038 Unit 4, Turkey Point, for Replacement of CCW, Revision 5, dated October 28, 1988.

The team compared these 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 4-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-sectional 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.

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

This item is unresolved item (89-203-18).

FPL Response:

The responses to the individual deficiencies are as follows:

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 base plate procedure do not represent the actual support configuration, the procedure is still applicable.

Teledyne reviewed SR-703 and determined that the baseplate edge distance amplification factor was 1.0 and therefore the engineering procedure was not required to be used: 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 the anchor bolts.

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.

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

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.

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.

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 square root sum of the squares (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.
Teledyne revised the affected stress packages to address the AISC web crippling check.

For all identified deficiencies, 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(1).

To avoid recurring deficiencies, the pipe support criteria will be revised to address baseplate uplift, single angle bending and the AISC web crippling check. The Teledyne computer code will be revised to eliminate the need to perform hand calculations using the SRSS method. These two documents will be revised by March 1, 1990.

Reference:
(1) Teledyne Calculations 6961C-1, Revision 4 "Stress Problem 025" and 6961C-3, Revision 6 "Stress Problem 038/CCW-24"

DEFICIENCY 89-203-20: CDR VERIFICATION

Discussion: The CDRs for the RPS, CCW, and electrical distribution systems were reviewed. The CDRs were found to contain erroneous and unnecessary information, as follows:

- The CCW chemical mixing pot was inferred to have been replaced when it had only been moved to a different location on the system.
- The CCW pump start sequence description was incomplete.
- The CCW containment isolation valve stroke times were not consistent with the TS requirements.
- The instrument voltage tolerances were improperly specified.
- The methodology for cable short circuit calculations was inconsistent with actual practice.
- The discharge profile was ambiguously defined.

These concerns led to the conclusion that the CDR had not been appropriately verified. The licensee has agreed to perform some additional verification of the CDR information. The licensee also issued a directive which restricted the use of CDR information in the design process.

This item is unresolved (89-203-20)

FPL Response:

FPL has committed to perform a Component Design Requirements (CDR) verification. In the interim, a directive has been issued which restricts the usage of CDR information. The verification will take place in several stages. First, the accuracy and reliability of CDR information will be improved in a "CDR Repair" project. The main objective will be to provide true component requirements in a clear, concise and verifiable format. Upon completion of "CDR Repair" for the 18 select systems, "CDR Verification" will be performed. This effort will include a verification/validation of CDR information. The scope of this verification will be finalized in procedures, and is expected to focus on key design requirements (attributes) that demonstrate the functional capability of the components. The "CDR Verification" effort is scheduled for completion by June 30, 1991.

DEFICIENCY 89-203-23: ACCEPTABILITY OF THE MINIMUM BATTERY TERMINAL VOLTAGE

Discussion: The minimum end-of-service-life battery terminal voltage is 105 Volts Direct Current (VDC). There is no evidence that the terminal voltage is adequate to power all safety-related devices. The licensee has performed individual voltage drop calculations for load addition or modification. The licensee has not performed a bounding calculation to show that all devices located remotely from the battery bus will be able to operate successfully.

While some tests have been performed, certain components were bypassed during the testing and were therefore not verified to operate at the low battery terminal voltage.

Adequate assurance does not exist that the combination of the minimum battery terminal voltage and system voltage drop considerations will yield sufficient equipment voltages to maintain equipment functionality.

This is unresolved item 89-203-23.

FPL Response:

A bounding calculation as described above is not a licensing requirement for Turkey Point. Individual voltage drop calculations for load additions and modifications have been performed as necessary. However, to provide additional assurance that all equipment required to operate will do so at the minimum battery terminal voltage of 105 volts, a bounding calculation will be performed.

This calculation will demonstrate the acceptability of the DC equipments' voltage ratings of 105 volts. This work is scheduled for completion by December 31, 1990.