ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9010170221 DOC.DATE: 90/10/09 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
AUTH.NAME AUTHOR AFFILIATION
HARRIS,K.N. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards info re status of PEP-4 unresolved/inspector followup items in Design Validation Insps 250,251/89-203.

DISTRIBUTION CODE: IE01D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 31
TITLE: General (50 Dkt)-Insp Rept/Notice of Violation Response

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-2 PD	1	1	EDISON,G	1	1
INTERNAL:	AEOD	1	1	AEOD/DEIIB	1	1
	AEOD/TPAD	1	1	DEDRO	1	1
	NRR MORISSEAU,D	1	1	NRR SHANKMAN,S	1	1
	NRR/DLPQ/LPEB10	1	1	NRR/DREP/PEPB9D	1	1
	NRR/DRIS/DIR	1	1	NRR/DST/DIR 8E2	1	1
	NRR/PMAS/ILRB12	1	1	NUDOCS-ABSTRACT	1	1
	OE DIR	1	1	OGC/HDS2	1	1
	REG FILE 02	1	1	RGN2 FILE 01	1	1
EXTERNAL:	NRC PDR	1	1	NSIC	1	1

R I D S / A D D S

R I D S / A D D S

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 20 ENCL 20

FPL

P.O. Box 029100, Miami, FL, 33102-9100

OCT 09 1990

L-90-350

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
Status of the PEP-4 Unresolved Items and Inspector Follow-up Items Contained in the Turkey Point Design Validation Inspection (50-250 and 50-251/89-203)

The attachments to this letter provide the status of the actions taken by Florida Power and Light to resolve the items identified as Unresolved Items and Inspector Followup Items in the Turkey Point Design Validation Inspection (50-250 and 50-251/89-203) of November 22, 1989.

Attachment I discusses the status for the Appendix B items (89-203-10 through 89-203-23) of the referenced inspection report. These items are related to the Safety System Functional Inspection performed during this inspection. For those items not already complete the expected completion schedules and proposed actions for completion are included.

Attachment II provides the status of items 89-203-01 through 89-203-09 (50-250 and 50-251/89-203 Appendix C) contained in the report. This chart provides the Milestone Schedule of the remaining open Performance Enhancement Program (PEP) Project 4 activities. It provides an identification of those open items considered to be closed by FPL and the expected completion date for those remaining open.

Should there be any questions, please contact us.

Very truly yours,

K.N. HARRIS by O.J.S. Pearce

K. N. Harris
Vice President
Turkey Point Nuclear

KNH/JEK/jk

Attachments

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

IE01
1/1

INTRODUCTION

The NRC, in September and October of 1989, performed a Design Validation Inspection (DVI) of the Turkey Point Power Plants Units 3 & 4. This NRC inspection was performed at both the Turkey Point site and the Nuclear Engineering offices at Juno Beach and included personnel from both the plant and engineering staffs.

The purpose of the inspection was to assess the effectiveness of the actions that Florida Power and Light Company (FPL) has implemented as part of the Turkey Point Performance Enhancement Program (PEP) Project 4 on configuration control. The NRC inspection team performed a Safety System Functional Inspection (SSFI) on three systems to review the implementation of the PEP actions. The NRC documented the results of their audit in Reference 1.

A review of the Reference 1 report places the NRC comments into one of two general categories, which were identified and assigned[(2)] as follows:

I. Inspector Follow-up Items resulting from incomplete PEP Project 4 activities.

These activities are identified in Appendix C of Reference 1 as IFI's 89-203-02 through 89-203-09.

The JPN response and schedule for these items were established in Reference 3.

II. Inspector Follow-up Items and Unresolved Items

These items are identified in Appendix B of Reference 1 and in the main body of the report as noted.

FPL ITEM NO.	NRC ITEM NO.	REPORT REFERENCE	STATUS
JPN-CLF-001	URI 89-203-10	Page 8 Sec. 2.5.3	Complete
JPN-CLF-002	IFI 89-203-11	Page 8 Sec. 2.5.3	Complete
JPN-CLF-003	IFI 89-203-12	Page 8 Sec. 2.5.3	Complete

FPL ITEM NO.	NRC ITEM NO.	REPORT REFERENCE	STATUS
JPN-CLF-004	URI 89-203-13	Page 9 Sec. 2.5.3	Complete
JPN-CLF-005	URI 89-203-14	Page 9 Sec. 2.5.3	Complete
PTN-RER-006	URI 89-203-15	Page 13 Sec. 2.8.4	Complete
JPN-CLF-007	URI 89-203-16	Page 14 Sec. 2.8.4	11/90*
JPN-CLF-008	IFI 89-203-17	Page 14 Sec. 2.8.4	12/92
JPN-CLF-009	URI 89-203-18	Page 14 Sec. 2.8.4	Complete
JPN-CLF-010	IFI 89-203-19	Page 14 Sec. 2.8.4	Complete
JPN-LFP-011	URI 89-203-20	Page 16 Sec. 2.8.4	6/91
JPN-CRB-012	IFI 89-203-21	Page 17 Sec. 2.8.4	2/91
PTN-RER-013	IFI 89-203-22	Page 18 Sec. 2.8.4	Complete
JPN-CRB-014	URI 89-203-23	Page 19 Sec. 2.8.5	3/91

This report provides JPN responses to the above identified concerns.

References

1) USNRC Letter "Turkey Point Design Validation Inspection (50-250 and 50-251 (89-203)" from S. A. Varga (USNRC) to J. H. Goldberg (FPL) dated November 22, 1989

2) FPL Memo JPN-PTP-89-3061, "Response to NRC Design Validation Inspection of PTN Units 3 & 4" dated December 1, 1989

3) FPL Memo JPNS-PTN-89-5333, "Milestone Dates for NRC Issues" dated November 22, 1989

*This date reflects the start of the outage in which URI 89-203-16 will be completed. The other dates are estimated completion dates.

FPL ITEM #JPN-CLF-001/URI 89-203-10

CCW HEAT EXCHANGER FUNDAMENTAL FREQUENCY

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 18712-183-C-SJ183-02 Rev. 7, 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. 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 Item URI 89-203-10.

FPL ITEM #JPN-CLF-001/URI 89-203-10

CCW HEAT EXCHANGER FUNDAMENTAL FREQUENCY

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 FSAR allowables. New heat exchanger nozzle loads were also determined from these analyses.
- The heat exchanger qualification has been 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 was found. 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 has received from Target Technologies a revised final stress report. This report includes a consideration of the effects of the correct pedestal

FPL ITEM #JPN-CLF-001/URI 89-203-10

CCW HEAT EXCHANGER FUNDAMENTAL FREQUENCY

flexibility, the new nozzle loads, and the ground response spectra which correspond to the heat exchanger location. This report was incorporated into the heat exchanger replacement engineering documentation package.

This item is considered complete.

References:

1) Bechtel Calculation 18712-183-C-SJ183-02 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-SJ183-12 Revision 1, "CCW Heat Exchanger Pedestal Stiffness Analysis"

FPL ITEM #JPN-CLF-002/IFI 89-203-11

SHELL-SIDE NOZZLE LOADS FOR REPLACEMENT

CCW HEAT EXCHANGERS

Discussion: FPL engineering package PC/M 88-263 was written for replacement of the Unit 4 heat exchangers. Teledyne calculation 6961C-1, Analysis of Stress Problem 025 Unit 4, Turkey Point, for Replacement of CCW Heat Exchangers included the qualification of the CCW piping attached to the CCW heat exchanger shell-side nozzles. In order to reduce the shell-side nozzle loads, Teledyne input circumferential and longitudinal rotational spring constants at the pipe-nozzle interfaces instead of modeling these interfaces as rigid anchors. However, Teledyne did not input a translational spring in the global Z-direction to account for the transverse flexibility of the concrete pedestals supporting the heat exchanger. The addition of this translational spring constant to the piping mathematical model may change the frequency response of the attached piping, and may affect the magnitudes of the piping stresses and the shell-side CCW heat exchanger nozzle loads.

This item is an Inspector Follow-up Item IFI 89-203-11.

Response: The piping stress analyses for both the CCW and ICW piping have been revised, taking into account the pedestal flexibility[1][2]. New heat exchanger nozzle loads were also determined from these analyses. The revised analyses showed that both systems, including the pipe supports, piping and equipment, remain within FSAR allowables.

The heat exchanger qualification has been reviewed in order to determine the effect of the new nozzle loads calculated as discussed above. No adverse effect

FPL ITEM #JPN-CLF-002/IFI 89-203-11

SHELL-SIDE NOZZLE LOADS FOR REPLACEMENT

CCW HEAT EXCHANGERS

on heat exchanger qualification was found.

FPL has received from Target Technologies a revised final stress report. This report includes a consideration of the effects of the new nozzle loads. This report was incorporated into the heat exchanger replacement engineering documentation package.

Since the stress report was resubmitted to address revised nozzle loads, as tracked under FPL Item #JPN-CLF-001/URI 89-203-10, this item was considered complete at the time Revision 0 of this evaluation was issued.

References:

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

2) Bechtel Calculations 18712-M12-183-02 Revision 5, and 18712-M12-183-04 Revision 2, "ICW Piping Stress Analysis"

FPL ITEM #JPN-CLF-003/IFI 89-203-12

QUALIFICATION OF THE CONCRETE PEDESTALS FOR THE REPLACEMENT CCW HEAT EXCHANGERS

Discussion: FPL engineering package PC/M 88-263 was written for replacement of the Unit 4 heat exchangers. Bechtel calculation 18712-183-C-SJ183-02 Rev. 7, CCW Heat Exchanger Support Pedestal Load Evaluation, included a check of the heat exchanger concrete pedestals for the replacement heat exchanger seismic reactions. The Bechtel calculation computed the heat exchanger seismic reactions using Zero Period Acceleration (ZPA) loads, which implicitly assumed the concrete pedestals behave as rigid structures. However, Bechtel also did not access the concrete pedestal detail drawing. Without the civil drawing for the concrete pedestal, the load transfer between the heat exchanger and the top of the pedestal through the pedestal anchor bolts, the structural capacity of the pedestal itself, and the load transfer between the base of the pedestal and the building concrete slab, cannot adequately be checked. Calculation 18712-183-C-SJ183-02 Rev. 7, therefore contained several undocumented engineering judgements.

This item is an Inspector Follow-Up Item IFI 89-203-12.

Response: Calculations have been completed to show the adequacy of the heat exchanger support pedestals[1], taking into account the following:

- The pedestal flexibility in the direction of the longitudinal axis of the heat exchanger.
- New nozzle loads calculated using the appropriate pedestal flexibility.

FPL ITEM #JPN-CLF-003/IFI 89-203-12

QUALIFICATION OF THE CONCRETE PEDESTALS FOR THE

REPLACEMENT CCW HEAT EXCHANGERS

- Revised seismic accelerations based on the ground response spectra applicable to the heat exchanger location, instead of the unnecessarily conservative enveloping spectra originally provided to the replacement heat exchanger vendor.

No drawings showing the details of the support pedestals have been found. Accordingly, the calculations performed to verify the adequacy of the pedestals made the following conservative assumptions:

- The pedestal concrete strength is 3000 psi. This was the minimum concrete design strength used during the construction of Turkey Point 3 & 4[(2)]. This value is considered conservative, because the actual strength of structural concrete usually exceeds its specified design strength by a significant margin.
- The pedestals are reinforced with the minimum reinforcing requirements specified in ACI 318. This assumption is considered to be appropriate for the following reasons:
  - Field concrete pours of this type would most likely have been done under the direction of a site Civil Engineer, well versed in ACI Code requirements.
  - Pedestals poured without reinforcing and subjected to equipment loadings for several years would exhibit a degree of cracking not present in the subject pedestals.

FPL ITEM #JPN-CLF-003/IFI 89-203-12

QUALIFICATION OF THE CONCRETE PEDESTALS FOR THE REPLACEMENT CCW HEAT EXCHANGERS

- The anchor bolts attaching the heat exchangers to their pedestals have sufficient embedment to enable the full capacity of the bolts to be developed (i.e., brittle failure of concrete is precluded). For the 7/8-inch (diameter) anchor bolts used for heat exchanger anchorage, a minimum embedment of 7 inches would be required for the above assumption to be true[1][3]. A review of project design documents[4][5] has shown that the minimum length of 7/8-inch (diameter) anchor bolt typically used at Turkey Point 3 & 4 is 18 inches, which would result in a minimum embedment of 9 inches at the heat exchanger anchorage, thus showing the above assumption to be conservative.

Using the conservative assumptions listed above, the load transfer between the heat exchangers and the tops of the pedestals, the structural capacity of the pedestals themselves, and the load transfer between the bases of the pedestals and the building concrete slab, were all found to be adequate and within UFSAR allowables.

This item was considered complete at the time Revision 0 of this evaluation was issued.

References:

1) Bechtel Calculation 18712-183-C-SJ183-02 Revision 8, "CCW Heat Exchanger Support Pedestal Load Evaluation"

2) Specification 5610-C-20 Revision 3, "Specifications for Concrete"

3) Bechtel Design Guide C-2.34 Revision 2, "Anchor Bolt Design Guide"

4) Drawing 5610-C-903 Revision 6, "Anchor Bolt Schedule - Sheet 1"

5) Drawing 5610-C-904 Revision 15, "Anchor Bolt Schedule - Sheet 2"

FPL ITEM #JPN-CLF-004/URI 89-203-13

REPLACEMENT CCW HEAT EXCHANGER SHELL-SIDE NOZZLE LOADS

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 deadloads, 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 Item URI 89-203-13.

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 has received from Target Technologies a revised final stress report. This report includes a consideration of the effects of the newly revised nozzle loads.

Since the stress report was resubmitted to address revised nozzle loads, as tracked under FPL Item #JPN-CLF-001/URI 89-203-10, this item was considered complete at the time Revision 0 of this evaluation was issued.

FPL ITEM #JPN-CLF-005/URI 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:

- The effects of valve thrust;
- The need to support valve RV-3-1431 with a tieback from the 3-inch run pipe, since the branch line is not rigid;
- A stress check at the root of each branch line for the combined effects of pressure, deadload, valve thrust, and seismic loads; or
- 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 URI 89-203-14.

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

FPL ITEM #JPN-CLF-005/URI 89-203-14

CCW RELIEF VALVE REPLACEMENT

This review determined that the existing configuration for the relief valves continues to meet the Turkey Point UFSAR stress criteria, Appendix 5A.

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.

These reviews are documented in the Teledyne calculation(1).

This item was considered complete at the time Revision 0 of this document was issued.

References:

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

FPL ITEM #JPN-CLF-007/URI 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, deadload and seismic load. However, FPL could not access the anchorage calculations for the CCW pumps and surge tanks.

This item is Unresolved Item URI 89-203-16.

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.

FPL ITEM #JPN-CLF-007/URI 89-203-16

CCW PUMP AND SURGE TANK SEISMIC

QUALIFICATION AND ANCHORAGE CHECK

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 allowables. The expansion anchors used to attach the supporting members to the concrete walls have been shown to be acceptable for

FPL ITEM #JPN-CLF-007/URI 89-203-16

CCW PUMP AND SURGE TANK SEISMIC

QUALIFICATION AND ANCHORAGE CHECK

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.

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"

FPL ITEM #JPN-CLF-008/IFI 89-203-17

AUDITABILITY OF THE CCW STRESS PACKAGES

Discussion: Teledyne reviewed the safety-related, large-bore piping systems, equipment, and supports associated with the CCW system in Units 3 and 4 for acceptance to FSAR criteria. Bechtel previously reviewed these piping systems for functionality. Review of Teledyne calculations 6961C-1 and 6961C-3 revealed that the Teledyne stress packages cannot be audited as independent documents. The Teledyne calculations use information which Bechtel originally prepared, without clear reference to the originating Bechtel documentation. Examples of such unreferenced information include equipment nozzle thermal displacements and valve weights and offsets.

The Teledyne stress packages do not appear to incorporate, either directly or by reference, the Bechtel information required to make these stress packages auditable.

This item is an Inspector Follow-up Item IFI 89-203-17.

Response: Teledyne prepared stress packages to support FPL's seismic qualification of safety related systems for Turkey Point Units 3 & 4 (i.e. Bulletin 79-14). These packages used input from Bechtel to support the analyses. To support auditability, FPL plans to reference the Bechtel input documents on the isometric drawings which support each stress package. This will be incorporated into the Isometric Drawing Program which is currently addressing punchlist items to be included in revisions to the isometric drawings.

FPL ITEM #JPN-CLF-008/IFI 89-203-17

AUDITABILITY OF THE CCW STRESS PACKAGES

The Isometric Drawing Program is scheduled for completion by December 31, 1992 as part of the second ten year Inservice Inspection effort.

FPL ITEM #JPN-CLF-009/URI 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.

FPL ITEM #JPN-CLF-009/URI 89-203-18

CCW PIPE SUPPORT CALCULATIONS

- 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.
- 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.

This item is Unresolved Item URI 89-203-18.

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.

FPL ITEM #JPN-CLF-009/URI 89-203-18

CCW PIPE SUPPORT CALCULATIONS

- 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 have been 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 did not have the capability of

FPL ITEM #JPN-CLF-009/URI 89-203-18

CCW PIPE SUPPORT CALCULATIONS

combining the ZPA and seismic intertia loads using the SRSS method; it combined them absolutely. Therefore, Teledyne performed the SRSS combination of the ZPA and seismic interial loads by hand. Teledyne's computer program has been 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 was revised to address baseplate uplift and the AISC web crippling check. Teledyne determined that the pipe support criteria for single angle bending was sufficient as written. However, an internal memo was written to all Teledyne personnel on FPL projects clarifying the use of pipe support criteria as regards single angle bending. The Teledyne computer code was revised to eliminate the need to perform hand calculations using the SRSS method.

This item is considered complete.

Reference:

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

FPL ITEM #JPN-CLF-010/IFI 89-203-19

SMALL-BORE PIPE QUALIFICATION

Discussion: Bechtel Walkdown Package CCW-3-III-1 and backup calculation C-499-167 were reviewed. The team assessed the qualification of the branch lines to the governing criteria of Bechtel specification 5177-PS-21 "Project Implementation of User's Manual M-18 for Modification to Turkey Point Units 3 and 4". The calculation accepted two branch lines with frequencies of 22 - 24 Hz without requiring tieback supports to the piping run. The tie-back supports are required by the Bechtel specification for branch lines with fundamental frequencies less than 33 Hz.

This item is an Inspector Follow-up Item IFI 89-203-19.

Response: A stress calculation(1) was issued to qualify some of the branch lines of Walkdown Package CCW-3-III-1. These branch lines are designated as branch types E and F in the calculation, and have frequencies of 24 Hz and 22 Hz, respectively.

Appendix A, Section 6 of Bechtel Specification(2) requires tie-back supports for branch lines with fundamental frequencies less than 33 Hz. A review of the Containment Building Floor Response Spectra at elevation 68' indicates that the fundamental frequencies of branch lines E and F are greater than the frequency of the last peak (which occurs at 15 Hz), but less than the frequency at which Zero Period Acceleration (ZPA) values are reached (approximately 28 Hz). Therefore, the Type E and F branch lines cannot be considered to be in the rigid range, although their frequencies are well beyond the peak of the floor response spectra.

FPL ITEM #JPN-CLF-010/IFI 89-203-19

SMALL-BORE PIPE QUALIFICATION

Calculations were performed to determine the stresses for the Type E and F branch lines. The stress levels were determined to be within the allowable ranges for both OBE and SSE, thus indicating compliance with UFSAR, Appendix 5A. Therefore, the Type E and F branch lines are considered acceptable.

To avoid misinterpretation in future applications, Bechtel has reviewed and revised, as appropriate, procedure(s)/document(s) such that the recurrence of the above discussed finding is avoided.

This item is considered complete.

References:

1) Bechtel Stress Calculation C-499-167, Revision 0

2) Bechtel Specification 5177-PS-21 Revision 2, "Project Implementation of User's Manual
M-18 for Modifications to Turkey Point Units 3 & 4"

FPL ITEM #JPN-LFP-011/URI 89-203-20

CDR VERIFICATION

Discussion: The Component Design Requirements (CDR) statements were not subjected to the same verification process that the system level Design Basis statements underwent. As a result, there were numerous discrepancies identified in the CDRs during the audit. These discrepancies are being addressed individually to provide specific corrections, however, they also point out an underlying weakness in the CDR portion of the DBD reconstitution program. The audit team identified the lack of CDR verification as a significant weakness.

This item is Unresolved Item URI 89-203-20.

Response: FPL has committed to perform a 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.

FPL ITEM #JPN-CRB-012/IFI 89-203-21

PLANT OPERATING DIAGRAM ERRORS

Discussion: The NRC team reviewed the POD logic diagram for the component cooling water pumps and determined that the CCW pump 3B breaker close logic was in error. The diagram incorrectly indicated that a loss-of-offsite power load shedding signal would close the breaker and start the pump. The correct logic would open the breaker to clear the loads on the bus when a load shed signal were present. The team determined that the elementary diagrams implemented the correct logic. The licensee initiated DCR-TPI-89-187 to correct the error on the logic diagram.

The diagram incorrectly depicted the start/stop selector switch action for all CCW pumps except pump 3B. The logic diagram shows the switches as maintained in the stop position, which does not agree with the elementary diagram. These switches are spring returned to middle from start and stop, and pull-to-lock in the stop position.

The team also identified an error on the CCW T-E diagram where the drawing incorrectly shows a functional connection between the CCW pumps and the CCW pump discharge pressure channel PI-*-640C. The pressure channel is a local gauge with no electrical output, and the pump start function is provided by PC-*-611 which is correctly shown elsewhere on the drawing.

During a field inspection of miscellaneous relay rack 4QR46, the team identified a drawing discrepancy regarding the termination of PC-611X relay contacts wired out for the CCW low pressure alarm. The field inspection indicated that contacts 3 and 7 appear to be wired out, whereas the instrument loop diagram shows 4 and 8 were wired out. As wired in the field, the contacts will operate opposite to the contacts as shown on the drawing. The correct configuration depends on the external annunciator circuit, which the team did not review. The licensee agreed to investigate this discrepancy.

FPL ITEM #JPN-CRB-012/IFI 89-203-21

PLANT OPERATING DIAGRAM ERRORS

The errors in the POD drawings do not represent hardware errors and are considered comparatively minor, although they could mislead an inexperienced user. The POD errors cited herein appear to be isolated errors not typical of other PODs examined by the team.

The licensee agreed to investigate and correct the remaining errors and discrepancies.

This item is an Inspector Follow-up Item IFI 89-203-21.

Response: The discrepancy associated with the shedding logic of the CCW pump has been corrected[1]. For the remaining discrepancies, the actions necessary for issuing design packages for resolution of these items has been completed. As-building of the associated drawings will be completed using normal plant drawing priorities.

The actions necessary for complete resolution of this discrepancy will be completed by February 1, 1991. This reflects a change from the Revision 0 target of December 14, 1990 due to the relatively large volume of design packages for the Dual Unit Outage, unexpected volume of drawings from the recently completed Unit 3 refueling outage, and subsequent Plant efforts to reduce the PC/M backlog.

Reference:

1) Drawing Change Request DCR-TPI-89-187

FPL ITEM #PTN-RER-013/IFI-89-203-22

DC GROUND FAULT ADMINISTRATIVE CONTROLS

Discussion: The automatic pump start circuitry for a low CCW header pressure was reviewed by the NRC Audit team. A common control relay was provided for all of the CCW low pressure start circuits. The relay contact output wiring was found bundled together in the field. The team reviewed a FMEA for the circuit configuration. The FMEA demonstrated that internal rack wiring single failures would not disable both CCW trains. The FMEA took credit for the ungrounded direct current control circuit, such that a single ground would not blow the fuses and that the ground faults are detected and cleared. The team noted that the off-normal procedure for clearing grounds does not require an immediate action and does not specify a time limit to allow the ground to exist. This is an inspector follow-up item to evaluate the administrative controls to preclude ground faults from existing for extended time periods.

This item is Inspector Follow-up Item IFI-89-203-22

Response: FPL revised the following procedures to address the concern. ONOP-9608.1, "125 V DC System Location of Grounds," now contains a caution statement that action to isolate a ground should be initiated within four (4) hours of receiving a ground alarm. Specific actions to take if the ground exists for longer than twenty-four (24) hours is also provided within the procedure. Additionally, ONOP-9608.2, "Auxiliary 125 V DC System Location of Grounds," contains a specific step that requires notification of management should a ground in this system remain unidentified.

This item is considered complete.

FPL ITEM #JPN-CRB-014/URI 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 URI-89-203-23.

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 March 2, 1991. During the Revision 0 submittal, a targeted completion date of December 31, 1990 was set. However, the scope was underestimated and March 2, 1991 represents a more realistic target.

Attachment II